Missouri
Department of
Natural Resources

DRAFT INDIAN CREEK, TRIBUTARY TO INDIAN CREEK, AND COUTROIS CREEK TMDL PUBLIC COMMENTS

1st and 2nd Public Notices
Sept. 8, 2009 – Oct. 8, 2009
and
Nov. 13, 2009 – Dec. 13, 2009

Indian Creek – WBID # 1946
Trib. to Indian Creek – WBID # 3663
Courtois Creek – WBID # 1946

Washington County, Mo.

Missouri Department of Natural Resources
Water Protection Program
PO Box 176
Jefferson City, MO 65102-0176
800-361-4827 / 573-751-1300

draft TMDL Courtis Creek and Indian Creek

Dick & Judy Rogers to: john.hoke
Cc: "Dick & Judy Rogers", "terry J. Beckham"

10/19/2009 11:18 AM

John Hoke

I am a native of Steelville, Mo. who now resides in Boise, Id. who keeps up on water quality issues relating to the Code-Away/Courtois, Huzzah and the Meramac. I return home at least once a year and fish these streams and have done so for well over 50 years.

I am a retired professional engineer with degrees from UMR and UMC and worked the Idaho DEQ. I currently am a member of the Southwest Idaho BAG.

I question the value of using the gauging station on the Meramac near Steelville as being reflective of flows on the Code-Away as most natives well tell you that you can have a significant increase in flow on the Huzzah and not even a blip of an increase on the Code-Away.

Ever since the early seventy's there has been black suspended particles in the water of the Code-Away. These were not present in the 60's. I think the TMDL should address this suspended solids load.

In 1972 I floated the upper Code-Away down to the Berryman bridge and noted the stream looked sterile with respect to insect life and minnows very few bass were caught on this day.

Treating surface water from the tailings ponds is important but the proposed method is not sufficient. Plant growth may stabilize the tailings but the plants will most likely adsorb lead and zinc in their leaves along with any grasses, etc. Such growth should be removed from the area because when it decays the metals will be reintroduced to the water environment next spring.

Seepage from the tailings ponds must be addressed and I would suggest either capping the ponds with an impervious material or collecting the seepage and treating to meet water quality standards.
You may want to contact the Seattle, Wa. EPA office and review the work done at the CIA at Bunker Hill mining complex, Kellogg, Id. with respect to treating pond seepage.

The milling process usually has flotation agents associated with it are any of them of a water quality concern and if so should they be addressed in this TMDL.?

People should be advised not to drink water from these creeks as boiling will only concentrate the pollutants.
Sincerely
Richard Rogers
1066 Saratoga Dr.
Boise, Id. 83706

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

January 4, 2010

Mr. Richard Rogers
1066 Saratoga Drive
Boise, ID 83706

RE: Response to Comments on the Indian Creek, Tributary to Indian Creek, and Courtois Creek Total Maximum Daily Load

Dear Mr. Rogers:

The Missouri Department of Natural Resources (Department) appreciates your comments on the draft Indian Creek, Tributary to Indian Creek, and Courtois Creek Total Maximum Daily Load (TMDL). This letter responds to comments provided in your October 19, 2009 e-mail following the first public notice period for this TMDL from September 8 – October 22, 2009. Please find herein the Department's response to each comment and the location of the revision (if applicable) within the final document as it will be submitted to the U.S. Environmental Protection Agency.

Comment 1 – "I question the value of using the gauging station on the Meramec near Steelville as being reflective of flows on the Code-Away as most natives will tell you that you can have a significant increase in flow on the Huzzah and not even a blip of an increase on the Code-Away."

Due to an absence of flow data for the Courtois Creek and Indian Creek watersheds, flows for the TMDL were synthesized using long-term data from the U.S. Geological Survey stream gauge site on the Meramec River near Steelville, Missouri (07013000). This gauge was chosen because it is within the same hydrologic unit as Courtois Creek and is located in an area having similar physiography and geology. Correcting this data for watershed area provides a reasonable approximation of the range of flows for the Courtois Creek watershed.

Comment 2 – "Ever since the early seventy's there has been black suspended particles in the water of the Code-Away. These were not present in the 60's. I think the TMDL should address this suspended solids load."

In accordance with Section 303(d) of the federal Clean Water Act, this TMDL addresses the water body impairments as listed in Missouri's most recent EPA approved 303(d) List of impaired waters. Currently, Missouri does not have numeric water quality criteria for suspended solids and available data and staff observations have not indicated violations of the state's general, or narrative, water quality criteria. For these reasons, these water bodies have not been determined to be impaired by suspended solids.

Comment 3 – "In 1972 I floated the upper Code-Away down to the Berryman bridge and noted the stream looked sterile with respect to insect life and minnows very few bass were caught on this day."

Section 3.2 of the TMDL document shows the impaired uses as being protection of warm water aquatic life for Indian Creek and the Tributary to Indian Creek, and cool-water aquatic life for Courtois Creek. These uses were listed as impaired due to benthic macroinvertebrate[1] data collected in 2001 and 2002, which show reduced individual numbers as well as a reduction in species diversity. These data appear to corroborate your visual inspection of the stream and this TMDL will address these aquatic life impairments.

Comment 4 – "Treating surface water from the tailings ponds is important but the proposed method is not sufficient. Plant growth may stabilize the tailings but the plants will most likely adsorb lead and zinc in their leaves along with any grasses, etc. Such growth should be removed from the area because when it decays the metals will be reintroduced to the water environment next spring."

Utilizing vegetation for mine site reclamation is a common and recommended practice that has been shown to stabilize mining lands and reduce pollution resulting from storm water runoff. Although some plants have shown an ability to sequester heavy metals from the soil, the reduction of erosion and available runoff will provide an overall net reduction of lead and zinc loading into the impaired water bodies. Should post-TMDL implementation monitoring show significant contributions of lead and zinc to the water bodies resulting from revegetated areas, the TMDL implementation plan can be reviewed and adjusted to allow for the proper removal and disposal of the vegetation.

Comment 5 – "Seepage from the tailings ponds must be addressed and I would suggest either capping the ponds with an impervious material or collecting the seepage and treating to meet water quality standards."

Current data suggests the dissolved lead and zinc impairments of Indian Creek, Tributary to Indian Creek, and Courtois Creek are a result of storm water runoff, such as from tailings impoundments and haul roads, or overflow from mine dewatering ponds. While available data does not suggest that seepage is a significant source of metals to the impaired segments, post-implementation monitoring can be used to determine any additional sources of impairment. At that time, if seepage is determined to be a significant contributor of dissolved lead and zinc to the impaired segments, the TMDL implementation plan will be reevaluated and adjusted as necessary.

Comment 6 – "The milling process usually has flotation agents associated with it are any of them of a water quality concern and if so should they be addressed in this TMDL?"

Milling processes currently do not occur in these impaired watersheds and extracted ore is hauled via truck to an offsite location for processing. For this reason, milling associated pollutants (e.g., flotation agents) are not expected to occur in the impaired segments and TMDL targets and reductions are not necessary.

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[1] (benthic = bottom, macro = large, invertebrate = animal without a backbone)

Comment 7 – "People should be advised not to drink water from these creeks as boiling will only concentrate the pollutants."

Indian Creek, Tributary to Indian Creek, and Courtois Creek are currently not assigned the drinking water supply designated beneficial use. For this reason, state water quality criteria associated with the drinking water supply use do not apply. However, it should be noted that the chronic dissolved lead and zinc criteria associated with aquatic life uses, and the targets outlined in the TMDL document, are protective of the dissolved lead and zinc criteria associated with the state's drinking water supply use. Waters assigned the drinking water supply use are for the maintenance of raw water which will yield potable water after treatment by a public water treatment facility.

The Department is unaware of households using these water bodies as a drinking water supply source. According to the Department's Wellhead Protection Section, the predominate drinking water source in the impaired Courtois Creek watershed is from public and private wells, that when properly cased and grouted per the Missouri Well Construction Rules, should not be influenced by surface water.

Thank you again for your comments. If you should have questions or would like to discuss this TMDL further, please contact me at (573) 526-1446 or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102.

Sincerely,

WATER PROTECTION PROGRAM

John Hoke

John Hoke, TMDL Unit Chief
Water Quality Monitoring and Assessment Section

JH:mkl

Indian Creek, Trib, and Courtois Creek TMDL

Michael Kruse to: Weatherford.Jeffrey 11/16/2009 11:47 AM
Bcc: All Message Store, All Message Store

Jeffrey Weatherford,

In regards to your comments received Nov. 13, 2009 pertaining to current mining activities at the Doe Run Viburnum site (pasted below for your reference), the Mine Safety and Health Administration confirms the Viburnum #29 mine is active. According to Bill Zeaman, chief of the non-coal unit in the Missouri Department of Natural Resources' Land Reclamation Program, the #29 mining activities occur underground and no additional tailings are being added to the impoundments. He further states he often sees trucks hauling from this site. Because of your comment, I will be making the following two changes to the draft TMDL prior to final submittal to EPA. Thank you for your comment and please feel free to contact me if you have any additional comments or questions.

In section 1.5:

~~Although the Doe Run Company has ceased their mining activities in this area since 2004, the~~ **The** Doe Run Company ~~continues to~~ maintain**s** several permitted outfalls that discharge to both Indian Creek and Tributary to Indian Creek, as well as manages two large tailings impoundments within the watershed.

And in section 9.1:

Contaminated sediments along haul roads and in residential yards are potential contributors to the Indian Creek and Courtois Creek impairments. However, due to Superfund actions, much of the soil from these areas has been removed and remediated. Currently, no future remedial actions by Superfund are being planned. ~~Should mining activities recommence,~~ **F**uture road and residential yard contamination can be prevented through mining procedural practices, such as covering hauling vehicles and washing vehicle exteriors prior to leaving mining facilities.

Mike Kruse
Environmental Specialist
Div. of Env. Quality/Water Protection Program
Mo. Dept. of Natural Resources, Jefferson City
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----- Forwarded by Linda Mebruer/WPCP/DEQ/MODNR on 11/13/2009 02:23 PM -----

From:	Weatherford.Jeffrey@epamail.epa.gov
To:	"Linda Mebruer" <linda.mebruer@dnr.mo.gov>
Cc:	Trotter.Jennifer@epamail.epa.gov, Nazar.Kristen@epamail.epa.gov
Date:	11/13/2009 02:21 PM
Subject:	Re: 11-13-2009 Public Notice of Total Maximum Daily Load for Indian Creek (and trib) and Courtois Creek-Washington, Crawford and Iron Counties

Hi Linda:

Thanks for the info on the Viburnum Division. In reading your write up you mention that Mining in the area has ceased. The Viburnum Mine 29 in Washington County is still active. I believe the ore is transported from the #29 mine head frame to the Buick Concentrator for milling. The

haul road, which parallels Indian Creek, might be a significant source of heavy metals from surface run-off and/or air migration. Please call if you have any questions.

Jeffrey G. Weatherford, P.E.
U.S. EPA
212 Little Bussen Dr.
Fenton, MO 63026
636-326-4720 (office)
636-326-4722 (FAX)

MISSOURI COALITION FOR THE ENVIRONMENT
6267 Delmar Blvd. 2-E • St.Louis MO 63130 • 314-727-0600 Fax: 314-727-1665 • moenviron@moenviron.org • www.moenviron.org

October 22, 2009

Department of Natural Resources
Attn: John Hoke
Water Protection Program
Water Quality Monitoring and Assessment Section
P.O. Box 176, Jefferson City, MO 65102-0176

Re: Total Maximum Daily Loads (TMDL) for Indian Creek, Tributary to Indian Creek and Courtois Creek

Dear Mr. Hoke:

Missouri Coalition for the Environment submits the following comments for the Indian Creek and Courtois Creek TMDL. Thank you for accepting them by fax; a hard copy will follow shortly. We have the following concerns about the TMDL for Indian Creek and Courtois Creek:

1. Section 303(d) of the Clean Water Act requires that states develop a TMDL for impaired waters. The purpose of conducting a TMDL is to determine the maximum amount of a pollutant that a water body can receive and still meet water quality standards. This concept stands in opposition to the properties of lead and zinc and their detrimental effects on human health and the environment; as metals, these pollutants do not biodegrade and will continue to accumulate in the streams over time. Thus, a TMDL is not sufficient to ensure that water quality standards are met, and it is virtually guaranteed that Indian Creek and Courtois Creek will remain impaired waters.

2. The Clean Water Act requires that all streams be designated and protected for recreation and aquatic life (40CFR131.10(a)) at a minimum. Designated uses for the above-referenced streams include livestock and wildlife watering, secondary and whole body contact recreation, and protection of human health for fish consumption. At present, impaired uses are listed only as the protection of warm- and cool-water aquatic life; however, without strict control of lead and zinc discharges, recreational uses will no longer be attainable due to the significant health risk for humans.

3. There is a worrisome lack of sediment data in the TMDL. Although the TMDL reduces the allowable discharge of these toxic metals in the water, it would nonetheless permit these pollutants to continue to accrue in the sediment, which could lead to a long-term lead pollution problem because lead does not biodegrade and would accumulate over time. There is a need to collect data to determine how the sediment has been impacted thus far, as well as to develop cumulative limits for metals to be included in pollution discharge permits.

4. As noted in the TMDL, Doe Run Buick Mine/Mill is the primary contributor of pollution to Indian Creek and Courtois Creek, and has been identified as the source of the lead and zinc for which the TMDL has been conducted. At present, Doe Run pollution discharge permits have technology-based effluent limits, rather than the more stringent water quality-based effluent limits that account for individual dischargers' cumulative effects on the discharging water body. Given the type of pollutants being discharged into Indian Creek and Courtois Creek, water quality-based effluent limits should be utilized so that aquatic life and human health is protected.

The Missouri Coalition for the Environment requests that the TMDL for zinc and lead be reduced to zero in order to meet water quality standards set forth by the Clean Water Act and protect public health.

While the Coalition applauds DNR's attention and attempts to reduce lead and zinc discharges into the above referenced waterways, we believe that DNR should take a firmer stance on eliminating toxic effluent discharges and reducing pollution on all small streams across the state.

Thank you for considering our comments. Please do not hesitate to contact us if you have any questions.

Sincerely,

Noëlle Wyman

Noelle Wyman
Missouri Clean Water AmeriCorps
Missouri Coalition for the Environment
6267 Delmar, Suite 2E
University City, MO 63130-4722
314.727.0600

Caroline Ishida

Caroline Ishida
Staff Attorney
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STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

January 4, 2010

Ms. Noelle Wyman
Missouri Coalition for the Environment
6267 Delmar, Suite 2E
University City, MO 63130-4722

RE: Response to Comments on the Indian Creek, Tributary to Indian Creek, and Courtois Creek Total Maximum Daily Load

Dear Ms. Wyman:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the Missouri Coalition for the Environment on the draft Indian Creek, Tributary to Indian Creek, and Courtois Creek Total Maximum Daily Load (TMDL). This letter responds to comments received from the Coalition following the first public notice period for this TMDL held September 8 – October 22, 2009. Please find herein the Department's response to each comment and the location of the revision (if applicable) within the final document as it will be submitted to the U.S. Environmental Protection Agency.

Comment 1 – "Section 303(d) of the Clean Water Act requires that states develop a TMDL for impaired waters. The purpose of conducting a TMDL is to determine the maximum amount of a pollutant that a water body can receive and still meet water quality standards. This concept stands in opposition to the properties of lead and zinc and their detrimental effects of human health and the environment; as metals, these pollutants do not biodegrade and will continue to accumulate in the streams over time. Thus, a TMDL is not sufficient to ensure that water quality standards are met, and it is virtually guaranteed that Indian Creek and Courtois Creek will remain impaired waters."

The pollutant loads calculated for the Indian Creek, Tributary to Indian Creek, and Courtois Creek TMDL will ensure that dissolved lead and zinc criteria are met under all flow regimes and at all times within these watersheds. Implementation goals for the TMDL are to reduce current dissolved lead and zinc concentrations to at or below the specified criteria. Meeting TMDL targets thereby disallows dissolved metals concentrations to accumulate beyond the state water quality criteria. Post implementation monitoring will provide additional water quality data for evaluating the effectiveness of current permit limits and nonpoint source implementation practices. Should it become necessary, limits will be adjusted at the time of permit renewal to ensure TMDL wasteload allocation targets are met. Likewise, nonpoint source implementation practices will be evaluated to determine their overall effectiveness and modified to meet TMDL reduction goals, as necessary.

Comment 2 – "The Clean Water Act requires that all streams be designated and protected for recreation and aquatic life (40CFR131.10(a)) at a minimum. Designated uses for the above-referenced streams include livestock and wildlife watering, secondary and whole body contact recreation, and protection of human health for fish consumption. At present, impaired uses are listed only as the protection of warm- and cool-water aquatic life; however, without strict control of lead and zinc discharges, recreational uses will no longer be attainable due to the significant health risk for humans."

TMDLs are written for water body-pollutant pairs as listed on the most current EPA approved Missouri 303(d) List of impaired waters. The EPA approved 2004/2006 303(d) List indicates Indian Creek, Tributary to Indian Creek, and Courtois Creek have impairments of aquatic life uses resulting from exceedences of the dissolved lead and zinc criteria associated with those uses. Currently, Missouri does not have lead or zinc criteria associated with the human health consumption of fish or whole body contact recreation designated uses. However, the Department does consider data that may show violations of the state's general criteria regarding toxicity or health hazards to humans [10 CSR 20-7.031(3)]. Presently, the available data does not indicate any violations of the general criteria associated with toxicity to humans. As stated in the previous response, TMDL targets will maintain dissolved lead and zinc concentrations at or below the criteria for these metals and will eliminate the continuous accumulation of these metals in the water column.

Comment 3 – "There is a worrisome lack of sediment data in the TMDL. Although the TMDL reduces the allowable discharge of these toxic metals in the water, it would nonetheless permit these pollutants to continue to accrue in the sediment, which could lead to a long-term lead pollution problem because lead does not biodegrade and would accumulate over time. There is a need to collect data to determine how the sediment has been impacted thus far, as well as to develop cumulative limits for metals to be included in pollution discharge permits."

EPA has not yet established federal guidelines for toxic chemicals in stream or lake sediments. The relationship between the amount of a toxicant in sediment and the strength of the toxicity it exerts is not simple or straightforward. Two publications, *Calculation and Evaluation of Sediment Effect Concentrations for the* Amphipod Hyalella *azteca and the Midge Chironomus riparus,* C. Ingersoll et al., 1996, and *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*, D. MacDonald, et al., 2000, reviewed a large number of research papers on sediment toxicity and suggested numeric guidelines that could be used to judge the potential for toxicity to aquatic life. Currently, available sediment data for Courtois Creek shows the mean levels of metals in the sediments are less than the level at which some toxic effect on aquatic life is likely to occur (MacDonald, 2000). Therefore, sediment concentrations of lead and zinc were not cited as a cause of impairment in the 2004/2006 303(d) List. As noted in Section 8 of the TMDL, additional monitoring of sediments is currently planned for both Indian Creek and Courtois Creek. Should these data indicate elevated concentrations of lead and zinc above sediment toxicity guidelines, the TMDL will be reevaluated and may include sediment toxicity reductions for these pollutants.

Comment 4 – "As noted in the TMDL, Doe Run Buick Mine/Mill is the primary contributor of pollution to Indian Creek and Courtois Creek, and has been identified as the source of the lead and zinc for which the TMDL has been conducted. At present, Doe Run pollution discharge permits have technology-based effluent limits, rather than the more stringent water quality-based effluent limits that account for individual dischargers' cumulative effects on the discharging water body. Given the type of pollutants being discharged into Indian Creek and Courtois Creek, water quality-based effluent limits should be utilized so that aquatic life and human health is protected."

As noted in Section 9.1 of the TMDL document, effluent limits and monitoring requirements for the Doe Run, Viburnum facility will be reevaluated at next renewal to reflect the water quality targets set by the TMDL. The more protective of either the water quality or technology based effluent limits will then be included in the renewed facility operating permit.

Comment 5 – "The Missouri Coalition for the Environment requests that the TMDL for zinc and lead be reduced to zero in order to meet water quality standards set forth by the Clean Water Act and protect public health."

By definition, a TMDL calculates the maximum amount of a pollutant that a water body can receive and still meet water quality standards. The TMDL load duration curves developed for Indian Creek, Tributary to Indian Creek, and Courtois Creek provide the maximum pollutant loads at all flow regimes for meeting the state's water quality criteria for dissolved lead and zinc for the protection of aquatic life designated use. As stated in the response to Comment 2, numeric water quality criteria for human health uses have not been developed and current data do not show general criteria human health use impairment.

Thank you again for your comments. If you should have questions or would like to discuss this TMDL further, please contact me at (573) 526-1446 or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102.

Sincerely,

WATER PROTECTION PROGRAM

John Hoke, TMDL Unit Chief
Water Quality Monitoring and Assessment Section

JH:mkl

FACSIMILE

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Attorneys and Counselors at Law
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Telephone (573) 634-2266
Facsimile (573) 636-3306

To:	John Hoke
Facsimile:	(573) 522-9920
From:	Robert J. Brundage
Date:	October 6, 2009

Total number of pages transmitted (including this cover page):

COMMENTS

Please contact **Chera Lampe** at if any or all of the pages of this transmission are not received in good condition.

NEWMAN, COMLEY & RUTH P.C.
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ALICIA EMBLEY TURNER

October 6, 2009

Via Facsimile and U.S. Mail

Mr. John Hoke
TMDL Unit Chief
Water Pollution Control Branch
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Indian Creek and Courtois Creek TMDL

Dear Mr. Hoke:

I am writing you on behalf of The Doe Run Resources Corporation d/b/a The Doe Run Company in regards to the draft TMDL for Indian Creek, Tributary to Indian Creek and Courtois Creek. This TMDL's public notice closes on Thursday, October 8, 2009. The purpose of this letter is to request an extension of the public comment period until Monday, November 9, 2009.

During the comment period Doe Run's consultants, LimnoTech, contacted your section to request the data supporting the TMDL. You were kind enough to provide to Mr. Hans Holmberg of LimnoTech a spreadsheet of data supporting the TMDL. Unfortunately, the spreadsheet did not contain the formulas upon which the data was derived. On Friday, October 2, 2009, you provided to Mr. Holmberg the spreadsheet containing the formulas.

As a result of our preliminary review of the TMDL and the information provided, we have serious concerns relating to several matters. For example, we have identified apparent discrepancies between the TMDL loading curves shown in Figures 3 through 6 and the corresponding allocations presented in Tables 3 through 6; illogical TMDL loads for zinc in Courtois Creek; and an unusual technical approach that ignores water quality data that do not exceed allowable loadings. We do not fully understand the technical approach, which appears to be different than a traditional load duration curve.

To help us better understand the data behind this TMDL and to answer other questions and concerns we have, we would like to meet with you and your staff prior to the end of the comment period. We believe such a meeting would facilitate a resolution to our questions and concerns that will likely result in a more thorough TMDL.

We would appreciate a reply to this extension request as soon as possible. Thank you for your consideration of this request.

Sincerely,

NEWMAN, COMLEY & RUTH, P.C.

Robert J. Brundage
rbrundage@ncrpc.com

RJB:ccl
cc: The Doe Run Company
Hans Holmberg

NEWMAN, COMLEY & RUTH P.C.

BRITTANY A. BARRIENTOS
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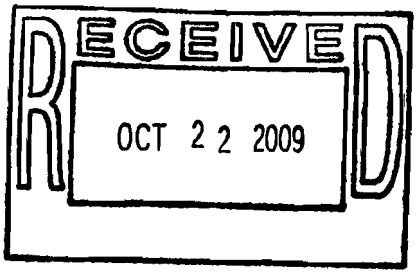
October 22, 2009



Mr. John Hoke
TMDL Unit Chief
Water Pollution Control Branch
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Indian Creek and Courtois Creek TMDL

Dear Mr. Hoke:

I am writing you on behalf of The Doe Run Resources Corporation d/b/a The Doe Run Company in regards to the draft TMDL for Indian Creek, Tributary to Indian Creek and Courtois Creek. The public notice period for this draft TMDL was extended until October 22, 2009. On behalf of The Doe Run Company, I hereby submit comments prepared by LimnoTech on behalf of Doe Run to comment on this draft TMDL.

I would like to thank you, Mr. Dkhili and Mr. Kruse for meeting with myself, LimnoTech, Doe Run staff and representatives from RMC on Wednesday, October 14, 2009. The enclosed memorandum from LimnoTech reduces to writing the comments made during our October 14, 2009, meeting and other comments not discussed during our meeting. I also appreciated receiving a copy of your October 19, 2009, email to Mr. Holmberg, reporting that the Department of Natural Resources will revise and correct its tables to match those values of the TMDL load duration curve. We also appreciate your agreement to modify the margin of safety to include the implicit margin of safety based upon the twenty-five percent hardness referenced in the regulations. We also appreciate you agreeing to remove the irrelevant language regarding the human health toxicity issues that were not part of the 303(d) listing nor the TMDL targets for the protection of aquatic life.

In your email of October 19, 2009, you request in-stream data collected by Doe Run to provide more representative hardness values for the waterbodies subject to the

TMDL. Mr. Holmberg provided you the hardness data via his email to you on October 19, 2009, at 11:31 a.m.

Finally, we believe the enclosed memorandum provides justification for flow tiered waste load allocations for the Doe Run Viburnam Mine. We believe that since the TMDL will be based upon a load duration curve based on differing in-stream flows, it only makes sense to provide flow tiered limits for the Doe Run Viburnum permit which according to the MDNR is the major source of metal loading for Indian Creek.

Thank you for the opportunity to comment on this TMDL. Should you have any further questions or need additional information or data, please do not hesitate to contact us.

Sincerely,

NEWMAN, COMLEY & RUTH, P.C.

Robert J Brundage

Robert J. Brundage
rbrundage@ncrpc.com

RJB:ccl
Enclosure
cc: The Doe Run Company (w/encl.)
Hans Holmberg, LimnoTech (w/encl.)
Jim Fricke, RMC (w/encl.)

LimnoTech
Water | Environment | Scientists | Engineers

MEMORANDUM

DATE: October 22, 2009

FROM: Hans Holmberg
Kathy Sweet

TO: Robert Brundage
Newman Comley & Ruth

CC: Denis Murphy, The Doe Run Company
Aaron Miller, The Doe Run Company
Jim Fricke, RMC

SUBJECT: Review of Draft TMDLs for Courtois Creek and Indian Creek

---

In cooperation with RMC, we have completed our review of the draft Total Maximum Daily Loads (TMDLs) for Indian Creek, Tributary to Indian Creek, and Courtois Creek, as drafted by the Missouri Department of Natural Resources (MDNR). We have identified several concerns with the TMDLs as drafted, and developed a recommended alternative that we believe is more straightforward and appropriate. This memorandum presents our comments and recommendations for the draft TMDLs.

Comments on the Draft TMDLs

Presented below are our comments, organized according to section headings in the draft TMDL.

Defining the Problem (section 1.4)

- The "Problem Definition" section of a TMDL usually focuses on a comparison of observed concentrations to water quality criteria, confirming the impairment and demonstrating the magnitude and frequency of violations. This section contains no such discussion of the impairments.
- Page 3, first full paragraph: As discussed at the October 14, 2009 meeting with MDNR, the discussions of the human health risks of lead and zinc are irrelevant; there is no indication that human health criteria have been violated, and this TMDL addresses aquatic life criteria. The potential impairments noted in Section 3.2 are protection of warm-water aquatic life in Indian Creek and Tributary to Indian Creek, and protection of cool-water aquatic life in Courtois Creek. At the meeting, MDNR agreed that this language should be removed from the TMDL.
- Page 3, first full paragraph: The mention of nickel and its bioavailability is not relevant and should be deleted as there is no nickel data presented in the TMDL report.
- The biological assessment study conducted by MDNR in 2001 and 2002, which is part of the basis of the 303(d) listing, did not consider reduction in biological diversity and fewer individuals related to distance from the headwaters of Indian Creek. MDNR compared species diversity and individuals midpoint down Courtois Creek at Highway 8 with the same values upstream near the headwaters of Indian Creek and Courtois Creek. MDNR did not account for habitat changes due to location in the watershed, increased flows and the potential influences from subdrainages located between the stations.
- The biological assessment data were collected prior to significant reductions in Doe Run's discharges of lead and zinc, and no longer represent current conditions at the site. As such, they should not be used as the basis for a TMDL.

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- Page 3, last paragraph: The relevance of the Superfund discussion is unclear. Overall, the references to human health criteria and the Superfund site seem intended to paint a picture of a high risk hazardous waste site, but this TMDL addresses only aquatic life impacts, and no evidence is provided of risks to other beneficial uses.

Point sources (section 2.1)

- Page 5: No data are provided to support the point source assessment or quantify the extent of Doe Run's contributions to the impairment.
- Reference to the Doe Run operations having five outfalls is inaccurate, there are currently four outfalls. Outfall 003, a decant line in the Old Viburnum tailings impoundment was removed in August of 2003. However, it is currently listed in the current draft permit; this will be addressed as part of the NPDES comment process.
- Page 6: Groundwater data collected at ten locations by Doe Run for the past twenty years do not indicate that significant amounts of lead and zinc leach from either impoundment (see Attachment 1). Data presented in Attachment 1 for the years 2003 through 2004 indicates that concentrations of metals in groundwater are consistent in locations located above and below the Viburnum facilities. One exception is total metals in well P4. This anomaly may be related to turbidity due to well construction; dissolved metals are consistent with data from other locations.

Nonpoint sources (section 2.2)

- This section notes that nonpoint sources of lead and zinc loading are expected to be minor. This point will be discussed further below.

Numeric Water Quality Targets (section 3.5)

- Page 8: Numeric water quality targets were calculated based on 25th percentile Courtois Creek hardness (170 mg/l), as determined from MDNR's for the Courtois Creek watershed. The TMDL Information Sheet indicates that Indian Creek hardness is 210 mg/l. The site-specific hardness for each waterbody should be used in calculating appropriate water quality criteria. We have provided Doe Run's monitoring data to MDNR for this purpose. In addition, since hardness often varies with flow, and the TMDL allocations are flow-based, the available data should be used to develop an appropriate hardness and water quality criterion for each flow category. The recommended approach presented below includes flow-variable hardness as appropriate.
- Page 8: Section 3.5.2 seems to be misplaced – it does not appear to relate to the water quality target at all. This section should contain an assessment of how the observed concentrations compare to the targets. The discussion of adjusting watershed flows is irrelevant in this section, and is repeated in the Loading Capacity section (where it belongs).

Modeling Approach and Synthesis of Flow Data (section 4.1)

- Page 9, sec 4.1: The conversion factor for converting loads to kg/day is incorrect; the value presented in this section will convert the loads to pounds/day.
- Page 9, sec 4.1: This section indicates that only uncensored data were used to plot observed pollutant loads. A summary of the data, including how many data points were censored, should be provided. Excluding censored data ignores valuable information and may bias the analysis.
- Adjusting observed loads for the upper watershed based on the flow at the watershed outlet is inappropriate. This approach significantly overestimates the observed loads. For example,

samples collected on September 18, 2001 show a lead concentration of 9.1 ug/l in Tributary to Indian Creek. Concentrations in Indian Creek and Courtois Creek, however, were less than the detection level. MDNR applied the flow at the downstream end of the watershed to the 9.1 ug/l concentration to calculate the watershed load, suggesting a much higher lead load than likely existed on that date.

Pollutant Load Reductions (section 4.3)

- There appears to have been an error in MDNR's calculation of the flow percentiles, resulting in the median flows presented in Tables 3-6 suggesting higher flows in Indian Creek than at the mouth of Courtois Creek, which is illogical. For example, Table 3 shows a median flow for Indian Creek at the 0-20 percent flow interval of 537.00 cfs, while Table 5 shows Courtois Creek median flow for that same interval as 344.25 cfs. Given that flows for both waterbodies were estimated using the same USGS stream gage, Courtois Creek flows should be consistently higher than Indian Creek flows. From MDNR's spreadsheet, it appears that flow percentiles for Indian Creek were calculated using several columns of the spreadsheet, rather than only a single column for Indian Creek flows.
- In general, MDNR's approach appears unnecessarily complicated, setting the TMDL based on "observed" loads, rather than simply on water quality criteria. EPA's Load Duration Curve Guidance states, ""A load duration curve is developed by multiplying stream flow with the numeric water quality target (usually a water quality criterion) and a conversion factor for the pollutant of concern." (EPA, 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs.* EPA 841-B-07-006 http://www.epa.gov/owow/tmdl/duration_curve_guide_aug2007.pdf)
- When we calculate allowable loads for the scenarios presented in Tables 3-6 we find loads different than what MDNR presents, often substantially so. For example, for lead in Indian Creek (Table 3), at a median flow of 5.13 cfs, and with the water quality criterion of 4.5 ug/l, we calculate a target load of 0.12 lb/d. We appreciate MDNR's willingness to review the load duration curves and TMDL tables, as discussed at our October 15th meeting.
- The Target Loads in Table 3 through 6 do not appear to match Figures 3 through 6. For example, Table 3 shows a Target Load for Indian Creek in the 80-100 percent exceedance category of 1.2 lb/day. But Figure 3 shows a much lower value on the TMDL curve.
- Page 12: The first two rows in Table 3 have the same observed and target loads, and neither of them match Figure 3.
- Page 12 states that, "Individual observed loads exceeding the TMDLs are reduced to a target load that is 90 percent of the TMDL load duration curve"; this appears to be an explicit margin of safety, in contradiction to statements later in the document that MDNR has used an implicit margin of safety. These statements are confusing, and it is unclear whether an appropriate margin of safety has been used. We suggest that use of the 25th percentile hardness to calculate criterion provides an implicit margin of safety and any additional margin of safety is not needed.
- Page 13, Table 6: It is unclear why the target load for the 20-40% exceedance category is so much lower than the other targets. This value should be between 369 and 443 lb/day, consistent with the relationship between flow and allowable load (allowable load = water quality criterion * flow). This appears to be an artifact of MDNR's approach to calculating the target loads based on observed data rather than a simple flow times criterion relationship.
- Page 13, Table 6. Similarly, observed loads for dissolved lead vary significantly over the 20-40 and 40-60 percent load exceeded suggesting that the observed data could be affected by either outliers or other sources of dissolved lead in Courtois Creek. This also appears most likely to be

due to MDNR's adjustment of observed loads based on downstream flows, combined with eliminating non-detects from the analysis.

- Page 13, Table 6: Several of the Percent Reduction values were incorrectly calculated. For example, reducing the load from 272.9 to 204 lbs/day is a 25% reduction, not a 33% reduction.

Wasteload and Load Allocation (Section 5)

- Page 13: It is not clear what is meant by the statement, "When establishing wasteload and load allocations, the more protective of the percent reduction required for the water body or the TMDL loading was used to set allocations." Percent reductions should be consistent with the TMDL loadings.
- Page 13, 2nd paragraph of section 5.1: This paragraph seems out of place and is not relevant to the WLA discussion.
- Pages 14-15: Load allocations are very high at the higher flows, in some cases representing 95% of the total allowable load. Other sections of this TMDL have repeatedly referred to nonpoint sources as "minor" and "negligible". If nonpoint sources are so insignificant, there is no reason to give them such a huge load allocation at the higher flows. The point sources are impacted by precipitation as recognized in the permits. Therefore, increasing WLAs should be allotted to the point sources at higher flows. This is also consistent with providing an opportunity to develop flow-tiered limits for the point sources. We have provided suggested load allocations in our recommendations, below.

Margin of Safety (section 6)

- The use of the 25th percentile hardness value provides an implicit MOS, and no additional MOS should be withheld from the allocations.

Implementation Plan (section 9)

- The TMDL document does not characterize all potential contaminant loading to the Courtois and Indian Creek watersheds. Based on data found in the Missouri Data Spatial Information System (http://msdis.missouri.edu/) there are over one hundred inactive and abandoned mine properties that drain into Courtois Creek from the Palmer Lead District located immediately north of Highway C. Because of these unaddressed potential sources, it is possible that water quality standards may not be achieved in Courtois Creek even if all discharges from the Doe Run Company's Viburnum operations are in compliance with permitted NPDES effluent limits and the numeric water quality targets set by the TMDL. Should this occur, the potential impacts from the historic mining and mineral processing operations in the Courtois Creek watershed should be investigated further and addressed as part of the implementation process for this TMDL.
- The statement: "Nonpoint source reductions are currently not necessary to reduce pollutant loading of dissolved lead and zinc to the Indian Creek and Courtois Creek watersheds" is inconsistent with MDNR's allocation of a large portion of the allowable load (in some cases up to 95% of the allowable load) to these sources. A more equitable allocation should be derived, allowing higher wasteload allocations at the higher flows.

Appendix B Data

- The range of the lead data shown in Appendix B is very broad, ranging from <0.08 ug/l to <100 ug/l. The <100 ug/l seems particularly high and might be due to a data entry error. This could result in a significant overestimation of loads, and should be examined.

Recommended Approach and Example Calculations

We recommend a straightforward approach to the TMDL, setting the TMDL equal to the stream flow times the water quality criterion. Doe Run's Indian Creek hardness data do not show a significant correlation between hardness and stream flow, so the 25th percentile hardness for all flow conditions, 275 mg/l, should be used to calculate the water quality criteria for Indian Creek. Doe Run's monitoring data for Courtois Creek, just below the confluence with Indian Creek, suggest a relationship between hardness and stream flow. We have calculated the 25th percentile hardness for each flow interval using the Doe Run data, and recommend using the hardness values presented in Table 1 to calculate water quality criteria.

Table 1. Recommended Courtois Creek Hardness

Flow Exceendance Interval	Flow range (cfs)	Hardness (mg/l)
80-100	0-49.1	235
60-80	49.1-69.7	232
40-60	69.7-107	185
20-40	107-202	157
0-20	202-1705	155

Table 2 provides example TMDL calculations for representative flows in Indian Creek. We have modified the flow intervals for this example, using the combined design flows for Doe Run's Viburnum mine outfalls as the lowest flow interval.

Table 2. Example Lead TMDL Calculations for Indian Creek

Flow Exceendance Interval	Flow range (cfs)	Hardness (mg/l)	Chronic Criterion (ug/l)	Representative Flow* (cfs)	TMDL (lb/d)
50-100	0-9.39	275	7.4	9.35	0.37
40-50	9.39-11.91	275	7.4	10.44	0.42
20-40	11.91-22.43	275	7.4	15.96	0.64
0-20	22.43-1338	275	7.4	36.9	1.48

* Representative flow is median flow for the exceedance interval, except for the lowest interval, which uses the combined design flow for the Doe Run discharges.

Once the TMDL is calculated, the allowable load must be allocated among point and nonpoint sources (the wasteload allocation and load allocation, respectively). To determine how much to allocate to each, we estimated the contribution of nonpoint sources, based on the existing flow and background concentration data, as follows:

- Subtracting the observed Doe Run discharge flows for outfalls 002 and 004 (for the period January 2006 through February 2009) from total estimated flows for Indian Creek and Courtois

Creek provided an estimate of "other" (background and nonpoint source) flows for each waterbody.

- MDNR's lead concentration data for Courtois Creek upstream of the confluence with Indian Creek (location 1943/29.5) were used to determine background concentrations. The median concentration for these data was 1 ug/l, assuming that censored data represented concentrations at half the level of detection.
- Applying this background concentration to the estimated nonpoint source flows provided an estimated nonpoint source load for each sampling date. These were compared to the total allowable load to determine what fraction of the allowable load was nonpoint sources, and therefore, what portion should be allocated to point sources.
- For Indian Creek, the point source allocation (wasteload allocation) fraction ranged from 87% to 100%, with a median of 90%. These values did not appear to be correlated with streamflow. We therefore propose that the wasteload allocation for Indian Creek be 90% of the TMDL for all flows above the lowest flow interval. At low flows, the Doe Run discharges are expected to be the only source, and should receive the full allocation, consistent with the draft TMDL.
- For Courtois Creek, the point source allocation (wasteload allocation) fraction ranged from 87% to 91%, with a median of 87%. These values did not appear to be correlated with streamflow. We therefore propose that the wasteload allocation for Courtois Creek be 87% of the TMDL. At low flows, the Doe Run discharges are expected to be the only source, and should receive the full allocation, consistent with the draft TMDL.

Tables 3 and 4 provide sample calculations for Indian and Courtois Creeks, respectively. Please note that these are example calculations only; we request that the TMDL be written as the flow multiplied by the criterion, without specifying a single value based on one flow that covers a range of flows.

Table 3. Example Lead TMDL Calculations for Indian Creek

Flow Exceedance Interval	Flow range (cfs)	Hardness (mg/l)	Chronic Criterion (ug/l)	Representative Flow (cfs)	TMDL (lb/d)	WLA %	WLA (lb/d)	LA (lb/d)
50-100	0-9.39	275	7.4	9.35	0.37	100%	0.37	0.00
40-50	9.39-11.91	275	7.4	10.44	0.42	90%	0.38	0.04
20-40	11.91-22.43	275	7.4	15.96	0.64	90%	0.58	0.06
0-20	22.43-1338	275	7.4	36.9	1.48	90%	1.33	0.15

Table 4. Example Lead TMDL Calculations for Courtois Creek

Flow Exceedance Interval	Flow range (cfs)	Hardness (mg/l)	Chronic Criterion (ug/l)	Representative Flow* (cfs)	TMDL (lb/d)	WLA %	WLA (lb/d)	LA (lb/d)
80-100	0-49.1	235	6.29	42.93	1.46	100%	1.46	0.00
60-80	49.1-69.7	232	6.19	58.59	1.96	87%	1.70	0.25
40-60	69.7-107	185	4.88	85.59	2.25	87%	1.96	0.29
20-40	107-202	157	4.10	145.94	3.23	87%	2.81	0.42
0-20	202-1705	155	4.05	344.25	7.52	87%	6.54	0.98

Table 1
Viburnum Groundwater Analytical Results
(2003-2004)

Well I.D.	Date	pH	Temp.C	Spec Cond	Bromide	Chloride	Flouride	Nitrite	Nitrate	Phosphate	Sulfate	Lead(D)	Lead(T)	Zinc(D)	Zinc(T)	Copper(D)	Copper(T)	Cadmium(D)	Cadmium(T)	Iron(D)	Iron(T)	Manganese(D)	Manganese(T)	Nickel(D)	Nickel(T)	Cobalt(D)	Cobalt(T)
Standard						250	4	10			250	0.015	0.015	6	5	1.3	1.3	0.005	0.005	0.3	0.3	0.05	0.05	0.1	0.1	1	1
P2	Not sampled casing blocked																										
P3	3/25/2003	7.1	12.5	537	0.047	0.68	0.046	<0.020	1.25	<0.020	4.84	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010	0.013	0.013	<0.010	<0.010
P4	3/26/2003	7.1	11.1	534	<0.02	0.35	0.028	<0.020	0.12	<0.020	1.02	0.01	0.82	<0.010	0.56	<0.010	0.046	<0.005	<0.005	<0.010	14.7	0.14	0.39	0.016	0.047	<0.010	0.037
P5S	Not sampled casing blocked																										
P5D	Not sampled casing blocked																										
P6S	3/26/2003	6.9	13.5	1480	0.38	67.3	0.029	<0.020	0.19	<0.020	621	<0.010	0.01	<0.010	0.019	<0.010	<0.010	<0.005	<0.005	<0.010	0.13	<0.010	<0.010	0.014	0.015	<0.010	<0.010
P6D	3/26/2003	7.2	13.7	1171	0.36	61.7	0.022	<0.020	0.088	<0.020	322	<0.010	0.033	0.01	0.096	<0.010	0.085	<0.005	<0.005	<0.010	21.5	<0.010	0.042	0.016	0.018	<0.010	0.043
P7	3/26/2003	7.2	12.1	1272	0.41	79.3	0.022	<0.020	0.15	<0.020	602	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.21	<0.010	<0.010	0.016	0.016	<0.010	<0.010
P8	3/25/2003	6.5	12.4	352	<0.02	0.98	0.076	<0.020	0.028	<0.020	16.5	<0.010	0.018	<0.010	0.019	<0.010	<0.010	<0.005	<0.005	<0.010	0.25	<0.010	0.011	0.013	0.013	<0.010	<0.010
P9	3/25/2003	6.8	12.1	249	<0.02	9.75	0.044	<0.020	0.026	<0.020	8.43	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.037	<0.010	<0.010	0.013	0.014	<0.010	<0.010
P10	3/26/2003	7.4	13.2	539	0.11	3.4	0.037	<0.020	1.09	<0.020	15.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.037	<0.010	<0.010	0.014	0.014	<0.010	<0.010
P11	3/25/2003	6.7	11.4	1095	0.09	4.98	0.16	<0.020	0.031	<0.020	541	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	0.037	0.015	<0.010	<0.010	0.013	0.014	<0.010	<0.010
P12	3/25/2003	7.0	12.6	1221	0.097	5.93	0.13	<0.020	0.1	<0.020	668	<0.010	0.028	0.11	6.79	<0.010	0.057	<0.005	0.035	0.021	62	1.6	5.13	0.064	0.33	0.04	0.37
P13	Not sampled casing blocked																										
P14	3/25/2003	6.8	13.8	440	0.11	8.54	0.066	<0.020	0.75	<0.020	30.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010	0.018	0.018	<0.010	<0.010
P2	Not sampled casing blocked																										
P3	6/10/2003	7.0	14	530	<0.02	2.01	<0.010	<0.020	0.095	<0.020	3.53	<0.010	<0.010	<0.010	0.017	<0.010	0.01	<0.005	<0.005	<0.010	0.059	<0.010	<0.010	0.01	0.012	<0.010	<0.010
P4	6/10/2003	7.0	16	602	<0.02	1.19	0.014	<0.020	0.071	<0.020	1.23	<0.010	1.9	<0.010	0.35	<0.010	0.09	<0.005	<0.005	<0.010	40.6	0.25	0.99	0.014	0.21	<0.010	0.094
P5S	Not sampled casing blocked																										
P5D	Not sampled casing blocked																										
P6S	6/10/2003	6.8	17	1713	0.28	56.7	<0.010	<0.020	0.16	<0.020	609	<0.010	<0.010	<0.010	0.016	<0.010	0.011	<0.005	<0.005	<0.010	0.05	<0.010	<0.010	0.012	0.013	<0.010	<0.010
P6D	6/10/2003	6.8	17	1336	0.43	54.6	0.01	<0.020	0.057	<0.020	308	<0.010	0.03	<0.010	0.075	<0.010	0.061	<0.005	<0.005	<0.010	21.6	<0.010	0.054	0.012	0.015	<0.010	0.047
P7	6/10/2003	6.6	15	1636	0.43	77.1	<0.010	<0.020	0.1	<0.020	609	<0.010	<0.010	<0.010	0.026	<0.010	0.012	<0.005	<0.005	<0.010	0.073	<0.010	<0.010	0.013	0.015	<0.010	<0.010
P8	Not Sampled water level below level of bladder																										
P9	6/10/2003	6.3	14	264	0.023	6.77	<0.010	<0.020	0.066	<0.020	12.3	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.02	<0.010	<0.010	0.011	0.01	<0.010	<0.010
P10	6/10/2003	6.7	15	540	0.075	6.4	0.01	<0.020	0.44	<0.020	14.4	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.01	<0.010	<0.010	0.011	0.011	<0.010	<0.010
P11	6/10/2003	6.3	15	1186	<0.02	3.79	0.017	<0.020	<0.020	<0.020	395	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	0.01	0.046	0.012	0.012	0.012	0.012	<0.010	<0.010
P12	6/10/2003	6.8	15	1410	0.086	5.11	<0.010	<0.020	0.063	<0.020	482	<0.010	0.023	0.061	7.1	<0.010	<0.010	<0.005	0.019	0.053	60.8	1.4	2.7	0.056	0.31	0.035	0.86
P13	Not sampled casing blocked																										
P14	6/10/2003	6.7	16	689	0.042	7.92	<0.010	<0.020	0.2	<0.020	27.2	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.011	<0.010	<0.010	0.014	0.014	<0.010	<0.010
P2	Not sampled casing blocked																										
P3	9/8/2003	7.3	17	537	<0.020	2.23	0.079	<0.020	0.14	<0.020	3.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010	0.011	0.011	<0.010	<0.010
P4	9/8/2003	7.3	17	590	<0.020	1.39	0.07	<0.020	0.13	<0.020	1.12	<0.010	0.15	<0.010	0.2	<0.010	0.06	<0.005	<0.005	<0.010	16.4	0.16	0.94	0.015	0.13	<0.010	0.45
P5S	Not sampled casing blocked																										
P5D	Not sampled casing blocked																										
P6S	9/8/2003	7.0	18	1756	<0.020	56.7	<0.010	<0.020	<0.020	<0.020	674	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.13	<0.010	<0.010	0.013	0.014	<0.010	<0.010
P6D	9/8/2003	7.1	19	1313	<0.020	43.5	<0.010	<0.020	<0.020	<0.020	390	<0.010	0.014	<0.010	0.032	<0.010	0.032	<0.005	<0.005	<0.010	10.5	<0.010	0.024	0.012	0.015	<0.010	0.021
P7	Not sampled pond flooded to top of pipe																										
P8	Not Sampled water level below level of bladder																										
P9	9/8/2003	6.9	14	277	<0.020	9.24	<0.010	<0.020	0.76	<0.020	9.25	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
P10	9/8/2003	7.1	15	495	<0.020	5.9	0.068	<0.020	1.35	<0.020	16.9	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010	0.01	0.011	<0.010	<0.010
P11	9/8/2003	6.8	16	1335	<0.020	6.3	0.016	<0.020	<0.020	<0.020	5.6	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.031	<0.010	<0.010	0.012	0.012	<0.010	<0.010
P12	9/8/2003	7	15	1281	<0.020	5.46	0.12	<0.020	<0.020	<0.020	438	<0.010	<0.010	0.15	3.3	<0.010	0.1	<0.005	0.006	0.015	18.7	1	2.3	0.057	0.21	0.037	0.45
P13	Not sampled casing blocked																										
P14	9/8/2003	7.2	17	626	<0.020	5.37	0.066	<0.020	0.4	<0.02	28.1	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010	0.011	0.012	<0.010	<0.010
P2	Not sampled casing blocked																										
P3	12/9/2003	7.2	13.4	505	<0.020	2.24	<0.010	<0.020	1.2	<0.020	3.62	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	<0.010	<0.010	<0.010	0.014	0.01	<0.010	<0.010
P4	12/9/2003	6.9	11.3	547	<0.020	1.36	0.26	<0.020	0.091	<0.020	1.42	<0.010	0.88	0.013	0.11	<0.010	0.23	<0.005	<0.005	<0.010	6.8	0.06	0.65	0.17	0.028	<0.010	0.13
P5S	Not sampled casing blocked																										
P5D	Not sampled casing blocked																										
P6S	12/9/2003	6.5	10.4	1565	<0.020	61.2	<0.010	<0.020	<0.020	<0.020	773	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.028	<0.010	<0.010	0.018	0.018	<0.010	<0.010
P6D	12/9/2003	6.4	10.5	1128	<0.020	49.3	<0.010	<0.020	<0.020	<0.020	318	<0.010	<0.010	<0.010	0.019	<0.010	<0.010	<0.005	<0.005	<0.010	3.9	<0.010	0.011	0.017	0.016	<0.010	<0.010
P7	Not sampled pond flooded to top of pipe																										
P8	Not Sampled water level below level of bladder																										
P9	12/9/2003	7.3	13.2	287	<0.020	5.69	0.014	<0.020	0.15	<0.020	8.32	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.016	<0.010	<0.010	0.014	0.014	<0.010	<0.010
P10	12/9/2003	6.8	12.4	577	<0.020	5.8	0.019	<0.020	0.93	<0.020	16.2	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	<0.010	0.018	<0.010	<0.010	0.015	0.017	<0.010	<0.010
P11	12/9/2003	6.8	12	1298	<0.020	5.99	0.031	<0.020	<0.020	<0.020	648	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.005	<0.005	0.023	0.038	<0.010	<0.010	0.016	0.017	<0.010	<0.010
P12	12/9/2003	7.1	12.2	1239	<0.020	6.05	0.021	<0.020	<0.020	<0.020	436	<0.010	0.022	0.17	2.16	<0.010	<0.010	<0.005	<0.005	0.022	51	1.18	1.96	0.016	0.14	0.037	0.18
P13	Not sampled casing blocked																										
P14	12/9/2003	6.7	12	626	<0.020	4.55	0.017	<0.020	0.12	<0.020	33.1	<0.010	<0.010	<0.010	0.015	<0.010	<0.010	<0.005	<0.005	<0.010	0.012	<0.010	<0.010	0.016	0.017	<0.010	<0.010

Notes: Units mg/l

Standard = State of Missouri drinking water supply and groundwater.

Exceedences in bold.

NEWMAN, COMLEY & RUTH P.C.

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NICOLE L. SUBLETT
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November 11, 2009

VIA EMAIL AND U.S. MAIL

Mr. John Hoke
TMDL Unit Chief
Water Pollution Control Branch
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Indian Creek and Courtois Creek TMDL

Dear Mr. Hoke:

I am providing you the enclosed memorandum from LimnoTech providing comment on the Indian Creek and Courtois Creek TMDL. Specifically, the enclosed memorandum encourages the Missouri Department of Natural Resources to utilize site-specific hardness data supplied by The Doe Run Company in the development of the TMDL. I thank you in advance for your consideration of the enclosed memorandum.

Sincerely,

NEWMAN, COMLEY & RUTH, P.C.

Robert J. Brundage

Robert J. Brundage
rbrundage@ncrpc.com

RJB:ccl
Enclosure
cc: The Doe Run Company (w/encl.)
Hans Holmberg, LimnoTech (w/encl.)
Jim Fricke, RMC (w/encl.)

LimnoTech
Water | Environment | Scientists | Engineers

DATE: November 11, 2009

MEMORANDUM

FROM: Kathy Sweet
Hans Holmberg

TO: Robert Brundage

SUBJECT: Instream Hardness Data for Courtois Creek and Indian Creek

---

After the October 14, 2009 meeting with MDNR related to the Indian Creek and Courtois Creek TMDLs, we provided MDNR with Doe Run's Discharge Monitoring Report (DMR) data for Viburnum outfalls 002, 004, and 007. In an email dated 11/2/09, John Hoke of MDNR indicated that only instream data are appropriate for use in the TMDLs, and that data must have been collected using appropriate methods and quality assurance/quality control measures. We have reviewed the Viburnum permit database and identified instream samples for both Indian Creek and Courtois Creek that we believe are appropriate for use in the TMDL. This memorandum summarizes the available instream hardness data for Indian Creek and Courtois Creek and provides Doe Run's data for use in the Indian Creek and Courtois Creek TMDLs.

Summary of TMDL Hardness Data

The draft TMDLs were based on a hardness of 170 mg/l, used to calculate water quality criteria for lead and zinc. This value is the 25th percentile from MDNR's database. MDNR's hardness data presented in the draft TMDL included only three data points for Indian Creek, and two for Tributary to Indian Creek. A total of 21 samples were included in MDNR's database for Courtois Creek, but none were collected within the impaired reach (between River Miles 26 and 29). Most (15 out of 21) of the samples in Courtois Creek were collected far downstream of the impaired reach. Table 1 summarizes MDNR's data.

Table 1. MDNR Hardness Data used in Courtois Creek and Indian Creek TMDLs

Water Body	River Mile	Number of Samples	Year(s) Collected
Courtois Creek	0.9	1	2003
Courtois Creek	5.1	1	2003
Courtois Creek	15.7	13	2000-2006
Courtois Creek	23.4	2	2001-2002
Courtois Creek	29.5	4	2001-2002
Indian Creek	0.1	3	2001-2002
Tributary to Indian Creek	0.1	2	2001-2002

Doe Run Instream Hardness Data

Doe Run routinely collects water quality data at three locations required in the NPDES permit, outfalls 002 (old tailings pond discharge to Indian Creek), 004 (new tailings pond discharge to Tributary to Indian Creek), and 007 (instream monitoring location in Courtois Creek just downstream of the confluence with Indian Creek). In addition, Doe Run has collected samples in Courtois Creek upstream of Indian Creek, and in Indian Creek upstream of outfall 002 and Tributary to Indian Creek. We have verified with Doe Run staff that EPA approved methods are used for sampling and analysis, and that Doe Run's laboratory is State Certified. Therefore, we believe these data are appropriate for use in the TMDL. Table 2 summarizes the Doe Run instream hardness data, which are provided in Attachment 1.

Table 2. Instream Hardness Data Collected by Doe Run

Water Body	Number of Samples	Years Collected
Indian Creek	27	2007-2009
Courtois Creek	43	2006-2009

Doe Run's database includes 27 samples collected in Indian Creek upstream of the Doe Run discharges. This represents a much more robust data set than MDNR's three Indian Creek samples, and we recommend that these data be used to calculate instream water quality criteria for developing the Indian Creek TMDL.

Doe Run's database for Outfall 007, the instream monitoring location in Courtois Creek, includes 43 hardness measurements in Courtois Creek. This is substantially more than MDNR's database, which included only 21 samples for Courtois Creek, none of which were collected in the impaired reach. We recommend these data be used in calculating instream water quality criteria for the Courtois Creek TMDL.

Attachment 1

Doe Run Instream Hardness Data (mg/l)

Indian Creek, upstream of Tributary to Indian Creek and Doe Run Outfall 002

Date	Hardness
5/8/2007	214
6/20/2007	334
7/17/2007	369
8/15/2007	387
9/12/2007	423
10/10/2007	368
11/8/2007	356
12/6/2007	367
1/9/2008	253
2/20/2008	185
3/12/2008	214
4/17/2008	133
5/6/2008	269
6/5/2008	294
7/11/2008	349
8/14/2008	381
9/11/2008	365
10/17/2008	353
11/5/2008	396
12/4/2008	427
1/9/2009	354
2/10/2009	194
3/4/2009	334
4/3/2009	253
5/4/2009	152
6/4/2009	217
7/8/2009	318

Courtois Creek, just downstream of Indian Creek (Instream Monitoring Point 007)

Date	Hardness
1/12/2006	228
2/16/2006	200
3/14/2006	120
4/18/2006	205
5/18/2006	165
6/19/2006	214
7/18/2006	241
8/7/2006	212
9/18/2006	225
10/10/2006	261
11/14/2006	227
12/13/2006	175
1/24/2007	152
2/21/2007	158
3/13/2007	185
4/18/2007	137
5/8/2007	153
6/20/2007	246
7/17/2007	282
8/15/2007	235
9/12/2007	289
10/10/2007	251
11/8/2007	285
12/6/2007	309
1/9/2008	233
2/20/2008	162
3/12/2008	156
4/17/2008	201
5/6/2008	231
6/5/2008	229
7/11/2008	260
8/14/2008	248
9/11/2008	218
10/17/2008	233
11/5/2008	281
12/4/2008	283
1/9/2009	255
2/10/2009	215
3/4/2009	217
4/3/2009	190
5/4/2009	132
6/4/2009	195
7/8/2009	231

NEWMAN, COMLEY & RUTH P.C.

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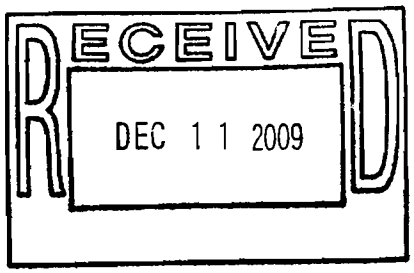
ALICIA EMBLEY TURNER

December 11, 2009



HAND-DELIVERED

Mr. John Hoke
Water Quality Monitoring and Assessment Section
Water Protection Program
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102-0176

Re: Draft TMDLs for Indian Creek, Tributary to Indian Creek, and Courtois Creek

Dear Mr. Hoke:

I am submitting the following comments on the draft TMDLs for Indian Creek, Tributary to Indian Creek, and Courtois Creek on behalf of my client The Doe Run Company. We appreciate the opportunity to discuss the previous draft TMDLs for Indian Creek, Tributary to Indian Creek, and Courtois Creek with you and your staff, and to submit our comments on the earlier drafts. We believe the revised draft TMDL released for public comment on November 13, 2009, is more technically sound than the previous draft, and we appreciate the revisions that MDNR has made based on our previous comments. However, some of our comments have not been addressed, and there is still room for improvement in this TMDL. Specifically, the hardness used to calculate metals criteria is inconsistent with the available data, and the allocation of allowable loads between point and nonpoint sources is inequitable and not supported by data. Our comments are presented below.

COMMENT NO. 1: Hardness

The draft TMDLs were based on a hardness of 170 mg/l, used to calculate water quality criteria for lead and zinc. This value is the 25th percentile from MDNR's database. MDNR's hardness data presented in the draft TMDL included only three data points for Indian Creek, and two for Tributary to Indian Creek. A total of 21 samples were included in MDNR's database for Courtois Creek, but none were collected within the impaired reach (between River Miles 26 and 29). Most (15 out of 21) of the samples in Courtois Creek were collected far downstream of the impaired reach. Table 1 summarizes MDNR's data.

Doe Run Instream Hardness Data

Doe Run routinely collects water quality data at three locations required in the NPDES permit, Outfalls 002 (old tailings pond discharge to Indian Creek), 004 (new tailings pond discharge to Tributary to Indian Creek), and 007 (instream monitoring location in Courtois Creek just downstream of the confluence with Indian Creek). In addition, Doe Run has collected samples in Courtois Creek upstream of Indian Creek, and in Indian Creek upstream of Outfall 002 and Tributary to Indian Creek. EPA-approved methods are used for sampling and analysis, and Doe Run's laboratory is State Certified. Therefore, these data are appropriate for use in the TMDL. Table 2 summarizes the Doe Run instream hardness data, which were provided to MDNR on November 11, 2009.

Table 1. MDNR Hardness Data used in Courtois Creek and Indian Creek TMDLs

Water Body	River Mile	Number of Samples	Year(s) Collected
Courtois Creek	0.9	1	2003
Courtois Creek	5.1	1	2003
Courtois Creek	15.7	13	2000-2006
Courtois Creek	23.4	2	2001-2002
Courtois Creek	29.5	4	2001-2002
Indian Creek	0.1	3	2001-2002
Tributary to Indian Creek	0.1	2	2001-2002

Table 2. Instream Hardness Data Collected by Doe Run

Water Body	Number of Samples	Years Collected
Indian Creek	27	2007-2009
Courtois Creek	43	2006-2009

Doe Run's database includes 27 samples collected in Indian Creek upstream of the Doe Run discharges. This represents a much more robust data set than MDNR's three Indian Creek samples, and we recommend that these data be used to calculate instream water quality criteria for developing the Indian Creek TMDL.

Doe Run's database for Outfall 007, the instream monitoring location in Courtois Creek, includes 43 hardness measurements in Courtois Creek. This is substantially more than MDNR's database, which included only 21 samples for Courtois Creek, none of which were collected in the impaired reach. We recommend Doe Run's data be used in calculating instream water quality criteria for the Courtois Creek TMDL.

COMMENT NO. 2: Wasteload Allocations

The draft TMDL does not consider the existing discharge flow rates from the Doe Run facility in assigning the WLAs, nor does it consider the dependence of the discharge flow rates on precipitation and the increase in assimilative capacity of the streams with increasing stream flows. Instead, the draft TMDL assigns a single WLA for all stream flow intervals based on an arbitrary low flow value. In doing so, the draft TMDL includes arbitrarily stringent WLAs. Instead, the TMDL should include a WLA that, at a minimum, allows Doe Run to discharge an effluent that meets the applicable water quality standards at the end-of-pipe at critical low-flows, and considers the increased assimilative capacity of the streams at higher stream flows.

For example, the WLA for lead in Indian Creek in the draft TMDL is based on a flow of 3.66 cfs. Using a hardness of 170 mg/L, the allowable load of lead in Indian Creek that meets the water quality standard at this flow and hardness is 0.09 lbs/day, as reported in the draft TMDL. The design flow rates, as specified in the draft NPDES permit for the Viburnum Operations (MO-0000086), issued September 11, 2009, includes a total of 6.01 MGD, or 9.38 cfs, for Outfalls 002 and 004. If the discharges from Doe Run were at this design flow rate and a lead level that met the chronic water quality standard at 170 mg/L at the end-of-pipe, the allowable load should be 0.23 lbs/day, over 2.5 times the corresponding WLA in the draft TMDL. Additionally, the discharges from the Viburnum Operations are dependent on precipitation and can increase substantially depending on climatic conditions, as recognized in the existing and draft permits. The WLAs in the draft TMDL make no account for the nature of these discharges and their dependence on precipitation.

To address the two issues noted above, we recommend that the WLAs in the TMDL be allowed a minimum value of:

$$WLA = Q_{discharge} * C_{WQS}$$

where C_{WQS} is based on a hardness value as suggested in our comment above.

At critical low flows in the receiving streams, the Doe Run discharges are expected to be the only source and should receive the full allocation, consistent with the draft TMDL. However, precipitation in the watershed increases the assimilative capacity of the receiving streams. Therefore, the TMDL should be written to provide an opportunity to develop flow-tiered limits for the Doe Run discharges that consider the increased assimilative capacity at higher stream flows. Instead, the draft TMDL assigns the entire loading capacity above the critical low-flow

value to the load allocation (LA). At the higher flow intervals in the draft TMDL, the LAs are arbitrarily allotted up to 99% of the total allowable load. This large LA is inconsistent with understanding that nonpoint sources are "minor" and "negligible" as noted in the draft TMDL. No data has been provided to suggest that nonpoint sources contribute a large portion of the existing lead and zinc loads. Because nonpoint sources are not significant contributors to the overall load, there is no reason to give them such a huge LA at the higher flows. Instead, the WLAs should be allowed to increase at higher stream flows on account of assimilative capacity of the receiving streams at higher flows.

To determine how much load to allocate to the WLA and LA at the higher flow intervals, we estimated the contribution of nonpoint sources, based on the existing flow and background concentration data. This analysis, provided to MDNR on October 22, 2009, indicated that the WLA should be 90% of the allowable Indian Creek load when stream flows exceed the Doe Run discharge flow rate. Similarly, the analysis showed that 87% of the allowable load in Courtois Creek should be allocated to the WLA for the higher flow intervals.

COMMENT NO. 3: ***Section 1.4***

The "Problem Definition" section of a TMDL usually includes a comparison of observed concentrations to water quality criteria, confirming the impairment and demonstrating the magnitude and frequency of violations. This section contains no such discussion of the impairments. Such a comparison is particularly important in this case, due to the significant reductions in Doe Run's discharges of lead and zinc, and the lack of recent biological assessment data.

COMMENT NO. 4: ***Section 4.1***

This section indicates that only uncensored data were used to plot observed pollutant loads. A summary of the data, including how many data points were censored, should be provided. Excluding censored data ignores valuable information and, in combination with MDNR's adjustment of pollutant loads based on stream flows at the watershed outlet, can make it appear that there are more frequent exceedances of the allowable load than the data truly indicate.

COMMENT NO. 5: ***Section 4.3***

It is unclear how MDNR derived the flow values presented in Tables 3-6. They do not appear to consistently match up with flows for the corresponding probabilities as presented in MDNR's spreadsheet or in Tables 7-10. For example, it appears from MDNR's spreadsheet that the flow for the 80-100 percent exceedance interval for Courtois Creek, as presented in Table 5, corresponds to the 96^{th} percentile exceedance flow, while the flow for the 60-80 percent interval corresponds to the 72^{nd} percentile exceedance flow. Further, in a typical load duration curve application, one would expect to see consistent flows across the exceedance intervals for the same waterbody. That is, the 80-100 percent exceedance flow for Indian Creek, for example,

should be the same, regardless of the pollutant. Thus, Flows listed in Table 3 should be the same as those in Table 4, and Table 5 flows should be the same as Table 6 flows.

COMMENT NO. 5: ***Section 5.3***

There appears to have been an error in MDNR's calculation of the flow percentiles, causing the flows presented in Tables 7-10 to indicate higher flows in Indian Creek than at the mouth of Courtois Creek, which is illogical given the much smaller Indian Creek watershed. For example, Table 7 shows a flow for Indian Creek at the 0-20 percent flow interval of 265.0 cfs, while Table 9 shows a Courtois Creek flow for that same interval as 201.9 cfs. Given that flows for both waterbodies were estimated using the same USGS stream gage, Courtois Creek flows should be consistently higher than Indian Creek flows. From MDNR's spreadsheet, it appears that flow percentiles for Indian Creek were calculated using several columns of the spreadsheet, rather than only a single column for Indian Creek flows.

COMMENT NO. 6:

Doe Run requests a list of all censored data and an explanation as to why MDNR did not use the data in its calculations.

On behalf Doe Run, we thank you for the opportunity to comment on these revised draft TMDLs. We appreciate the opportunity to comment, and look forward to working with you to resolve the remaining concerns regarding the calculations and allocations.

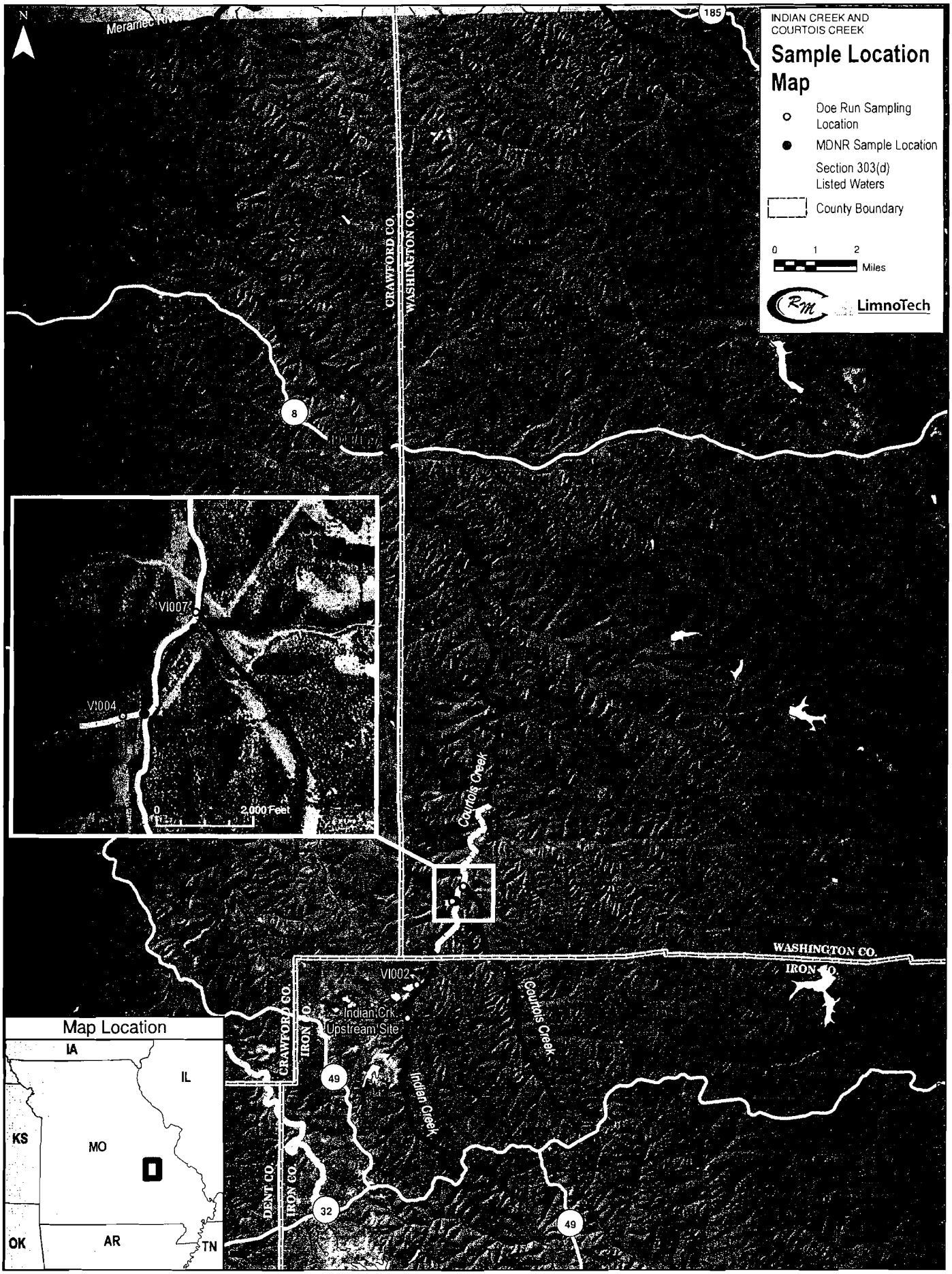
Sincerely,

NEWMAN, COMLEY & RUTH, P.C.

By: Robert J Brundage

Robert J. Brundage

Enclosures
cc: The Doe Run Resources Corporation (w/ encl.)


INDIAN CREEK AND
COURTOIS CREEK
Sample Location Map
Doe Run Sampling Location
MDNR Sample Location
Section 303(d) Listed Waters
County Boundary
0 1 2
Miles
LimnoTech
N
Meramec River
185
CRAWFORD CO.
WASHINGTON CO.
8
VI007
VI004
0 2,000 Feet
Courtois Creek
VI002
Indian Crk Upstream Site
WASHINGTON CO.
IRON CO.
CRAWFORD CO.
IRON CO.
Courtois Creek
Indian Creek
49
DENT CO.
IRON CO.
32
49
Map Location
IA
IL
KS
MO
OK
AR
TN

Doe Run Instream Hardness Data (mg/l)

Indian Creek, upstream of Tributary to Indian Creek and Doe Run Outfall 002

Date	Hardness
5/8/2007	214
6/20/2007	334
7/17/2007	369
8/15/2007	387
9/12/2007	423
10/10/2007	368
11/8/2007	356
12/6/2007	367
1/9/2008	253
2/20/2008	185
3/12/2008	214
4/17/2008	133
5/6/2008	269
6/5/2008	294
7/11/2008	349
8/14/2008	381
9/11/2008	365
10/17/2008	353
11/5/2008	396
12/4/2008	427
1/9/2009	354
2/10/2009	194
3/4/2009	334
4/3/2009	253
5/4/2009	152
6/4/2009	217
7/8/2009	318

25^{th} percentile = 235 mg/l

Courtois Creek, just downstream of Indian Creek (Instream Monitoring Point 007)

Date	Hardness
1/12/2006	228
2/16/2006	200
3/14/2006	120
4/18/2006	205
5/18/2006	165
6/19/2006	214
7/18/2006	241
8/7/2006	212
9/18/2006	225
10/10/2006	261
11/14/2006	227
12/13/2006	175
1/24/2007	152
2/21/2007	158
3/13/2007	185
4/18/2007	137
5/8/2007	153
6/20/2007	246
7/17/2007	282
8/15/2007	235
9/12/2007	289
10/10/2007	251
11/8/2007	285
12/6/2007	309
1/9/2008	233
2/20/2008	162
3/12/2008	156
4/17/2008	201
5/6/2008	231
6/5/2008	229
7/11/2008	260
8/14/2008	248
9/11/2008	218
10/17/2008	233
11/5/2008	281
12/4/2008	283
1/9/2009	255
2/10/2009	215
3/4/2009	217
4/3/2009	190
5/4/2009	132
6/4/2009	195
7/8/2009	231

25^{th} percentile = 188 mg/l

STATE OF MISSOURI
Jeremiah W. (Jay) Nixon, Governor • Mark N. Templeton, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

January 8, 2010

Mr. Robert J. Brundage
Newman, Comley & Ruth, P.C.
601 Monroe Street, Suite 301, P.O. Box 537
Jefferson City, MO 65102-0537

RE: Response to Comments on the Indian Creek, Tributary to Indian Creek, and Courtois Creek Total Maximum Daily Load

Dear Mr. Brundage:

The Missouri Department of Natural Resources (Department) appreciates the comments provided by the Doe Run Company on the draft Indian Creek, Tributary to Indian Creek, and Courtois Creek Total Maximum Daily Load (TMDL). This letter responds to comments received from the Doe Run Company following both the first and second public notice period for this TMDL. Please find herein the Department's response to each comment and the location of the revision (if applicable) within the final document as it will be submitted to the U.S. Environmental Protection Agency.

Comments Received During the First Public Notice Period (Letter dated October 22, 2009)

Comment 1 – *"The 'Problem Definition' section of a TMDL usually focuses on a comparison of observed concentrations to water quality criteria, confirming the impairment and demonstrating the magnitude and frequency of violations. This section contains no such discussion of the impairments."* (Section 1.4 Defining the Problem)

This section defines the problem of Indian Creek, Tributary to Indian Creek, and Courtois Creek as being impaired by dissolved lead and zinc as listed on Missouri's EPA approved 2004/2006 303(d) List of impaired waters. The section also states the reason for these listings is due to exceedences of the state's dissolved lead and zinc criteria for the protection of aquatic life. To more clearly refer the reader to the available data, a citation for the data location within the document has been added. Biological assessment data showing reduced individual numbers and species diversity is also noted and referenced. Comparisons of observed instream data to loads meeting the dissolved lead and zinc criteria are presented later in the document in Figures 4 through 7.

Comment 2 – *"Page 3, first full paragraph: As discussed at the October 14, 2009 meeting with MDNR, the discussions of the human health risks of lead and zinc are irrelevant; there is no indication that human health criteria have been violated, and this TMDL addresses aquatic life criteria. The potential impairments noted in Section 3.2 are protection of warm-water aquatic life in Indian Creek and Tributary to Indian Creek, and protection of cool-water aquatic life in Courtois Creek. At the meeting, MDNR agreed that this language should be removed from the TMDL."*

The Department concurs that the impaired designated beneficial uses addressed by this TMDL are the protection of warm water and cool water aquatic life. Because there are no human health designated uses with associated lead or zinc criteria assigned to the impaired water bodies and existing data does not show violations of the state's general criteria regarding toxicity or health risks to humans, this language has been removed.

Comment 3 – *"Page 3, first full paragraph: The mention of nickel and its bioavailability is not relevant and should be deleted as there is no nickel data presented in the TMDL report."*

Due to much of the discussion in the TMDL regarding the location of the impaired streams and the known influences of metals mining activities on these waters, concerns of nickel contamination were raised and therefore acknowledged. However, as stated in the TMDL, "...Department data does not show that a nickel impairment exists in these streams" and "For this reason, nickel is not addressed in this TMDL." For this reason, it was not necessary to include nickel data.

Comment 4 – *"The biological assessment study conducted by MDNR in 2001 and 2002, which is part of the basis of the 303(d) listing, did not consider reduction in biological diversity and fewer individuals related to distance from the headwaters of Indian Creek. MDNR compared species diversity and individuals midpoint down Courtois Creek at Highway 8 with the same values upstream near the headwaters of Indian Creek and Courtois Creek. MDNR did not account for habitat changes due to location in the watershed, increased flows and the potential influences from subdrainages located between the stations."*

For the 2001 and 2002 biological assessment study, a lower segment of Indian Creek and a seven mile segment of Courtois Creek, all downstream from the Doe Run Viburnum Division Operations, were compared with the Department's Biological Criteria for Perennial/Wadeable Streams database. Because Indian Creek is smaller in size than biological criteria reference streams, it was also compared to five regional reference streams of similar size within the same Ozark/Meramec Ecological Drainage Unit. Additionally, according to the Stream Habitat Assessment Project Procedure, for a study site to fully support a biological community, the total score of the study site should be 75 to 100 percent similar to the total score of a regional reference site. The Indian Creek #1 sample site had the highest habitat score for test stations, which was 112 percent of the mean regional reference value. The two remaining test stations (i.e. Courtois Creek #2 and #1) scores suggest that they should also be able to support a macroinvertebrate community comparable to the regional reference stations. Therefore, the Department believes the biological assessment is correct because comparisons of the invertebrate community were made with reference streams of similar size.

Comment 5 – *"The biological assessment data were collected prior to significant reductions in Doe Run's discharges of lead and zinc, and no longer represent current conditions at the site. As such, they should not be used as the basis for a TMDL."*

Biological assessment data and water chemistry data were both used to assess the water bodies as impaired. Current available data show violations of the state's dissolved lead and zinc water quality criteria. Therefore, Indian Creek, Tributary to Indian Creek, and Courtois Creek were included on the 2004/2006 303(d) List of impaired waters. As a result of violations of water quality criteria, targets presented in this TMDL for restoring the impaired waters are based on the state's dissolved lead and zinc water quality criteria. Compliance with the lead and zinc water quality criteria is expected to positively impact biological diversity and abundance in these waters.

Comment 6 – *"Page 3, last paragraph: The relevance of the Superfund discussion is unclear. Overall, the references to human health criteria and the Superfund site seem intended to paint a picture of a high risk hazardous waste site, but this TMDL addresses only aquatic life impacts, and no evidence is provided of risks to other beneficial uses."*

As previously mentioned in the response to Comment 2, all references to human health effects of lead and zinc have been removed. The paragraph mentioned above has been moved from the "Defining the Problem" section and added to the new section 1.5, "Lead and Zinc Mining Activities in the Impaired Watershed." The Superfund site discussion is relevant because documents pertaining to this site provide information regarding additional potential sources of lead and zinc, such as soils from residential yards and haul roads. Additionally, activities completed or under consideration by Superfund may aid in the implementation of this TMDL through the removal or remediation of contaminated soils.

Comment 7 – *"Page 5: No data are provided to support the point source assessment or quantify the extent of Doe Run's contributions to the impairment."*

TMDL source assessment characterizes known, suspected and potential sources of pollutant loading to the impaired water body. Pollutant sources identified within the watershed are categorized and quantified to the extent that information is available. The 4-digit federal standard industrial classification (SIC) for this facility is 1031 - Lead and Zinc Ores, which is defined by the United States Department of Labor's Occupational Safety and Health Administration as being "establishments, primarily engaged in mining, milling, or otherwise preparing lead ores, zinc ores, or lead-zinc ores." Existing lead and zinc effluent data indicate the Doe Run, Viburnum Operations facility has reasonable potential to cause or contribute to the dissolved lead and zinc impairments. The Doe Run facility is the only point source within the impaired watersheds that has a reasonable potential to cause or contribute to the impairments. Other facilities within these watersheds have general permits (non-metallic mining), are municipal facilities, or storm water permits. In addition, the presence of the tailings impoundments, documentation of past and present mining activities, and Superfund documentation of contaminated haul roads support the assessment that the Doe Run Viburnum site is a contributor to the impairment of Indian Creek, Tributary to Indian Creek, and Courtois Creek.

Comment 8 – *"Reference to the Doe Run operations having five outfalls is inaccurate, there are currently four outfalls. Outfall 003, a decant line in the Old Viburnum tailings impoundment was removed in August of 2003. However, it is currently listed in the current draft permit; this will be addressed as part of the NPDES comment process."*

Discussions with the Water Protection Program's NPDES Permits and Engineering Section indicate that a 2006 inspection observed a seep along or near the plugged pipe, resulting in a discharge from this location. Therefore, Outfall #003 must be permitted per state and federal rule. As such, the total amount of outfalls will remain unchanged in the TMDL.

Comment 9 – *"Page 6: Groundwater data collected at ten locations by Doe Run for the past twenty years do not indicate that significant amounts of lead and zinc leach from either impoundment (see Attachment 1). Data presented in Attachment 1 for the years 2003 through 2004 indicates that concentrations of metals in groundwater are consistent in locations located above and below the Viburnum facilities. One exception is total metals in well P4 This anomaly may be related to turbidity due to well construction; dissolved metals are consistent with data from other locations."*

The Department appreciates the opportunity to review the groundwater data provided by Doe Run. Although the data provided suggests that leachate is not a significant contributor of lead and zinc to groundwater, the presence of leachate must still be noted in the source assessment section as a possible, although potentially insignificant, source of lead and zinc to the impaired water bodies.

Comment 10 – *"Page 8: Numeric water quality targets were calculated based on 25th percentile Courtois Creek hardness (170 mg/l), as determined from MDNR's for the Courtois Creek watershed. The TMDL Information Sheet indicates that Indian Creek hardness is 210 mg/l. The site-specific hardness for each waterbody should be used in calculating appropriate water quality criteria. We have provided Doe Run's monitoring data to MDNR for this purpose. In addition, since hardness often varies with flow, and the TMDL allocations are flow-based, the available data should be used to develop an appropriate hardness and water quality criterion for each flow category."*

The Department appreciates the opportunity to review the hardness data provided by Doe Run. However, the Department does not believe Discharge Monitoring Report data are appropriately representative of a well-mixed situation in the receiving stream. Hardness, like other instream parameters such as pH and temperature, do not undergo simple dilution downstream of the outfall (i.e. plumes can occur) and the environment may act to buffer changes instream. Additionally, state regulation requires that instream hardness be calculated from "a representative number of samples from the water body in question or from a similar water body at the appropriate stream flow conditions" [10 CSR 20-7.031(1)(Y)].

The data used for TMDL targets and modeling should be of at least the same quality as that used to list the water body as impaired. Therefore, Quality Assurance/Quality Control (QA/QC) at the level required by the state's 303(d) Listing Methodology Document (LMD) is the minimum level the Department would consider for determining TMDL targets and modeling. The Department's 303(d) LMD outlines the QA/QC program specifics necessary for third party data to be accepted. In the absence of such documentation, the TMDL calculations will rely on the hardness data already collected and found in the TMDL document. For these reasons, the DMR data submitted by Doe Run will not be used to establish instream hardness values for the Indian Creek, Tributary to Indian Creek, and Courtois Creek TMDL. The hardness data used in the TMDL are representative of hardness values occurring in these water bodies and are expected to be protective over all flow ranges.

Comment 11 – *"Page 8: Section 3.5.2 seems to be misplaced - it does not appear to relate to the water quality target at all. This section should contain an assessment of how the observed concentrations compare to the targets. The discussion of adjusting watershed flows is irrelevant in this section, and is repeated in the Loading Capacity section (where it belongs)."*

Section 3 discusses applicable water quality standards and numeric water quality targets for the TMDL. Section 3.5.2 discusses the data used for TMDL target development. Specifically discussed in this subsection are the data source and the methodology used for data collection and normalization. Because this information is related to TMDL target development, its placement in Section 3 is appropriate. To provide additional clarification, the heading for Section 3.5.2 has been changed from "Data" to "Data for Target Development."

Comment 12 – *"Page 9, sec 4.1: The conversion factor for converting loads to kg/day is incorrect; the value presented in this section will convert the loads to pounds/day."*

All loads presented in this TMDL are represented in pounds per day. The text reading "kilograms" has been changed to read "pounds."

Comment 13 – *"Page 9, sec 4.1: This section indicates that only uncensored data were used to plot observed pollutant loads. A summary of the data, including how many data points were censored, should be provided. Excluding censored data ignores valuable information and may bias the analysis."*

Censored data includes all data collected with results below the level of detection. These data are recorded as being "less than the detection level of the instrument or method of measurement". In these instances, the values are recorded into the Department's water quality database as half the detection level with a "99" flag at the end, such as 0.499 or 1.2499 or 2.499. The data for Indian Creek and Courtois Creek contained 41 and 18 samples below the detection level for dissolved lead and zinc, respectively. These data were derived by methods using at least five different detection levels and show a large range of variability. For example, a value of 49.99 may be any number from zero to 100 µg/L. Therefore, to develop a more robust and scientifically defensible TMDL, these data were not used. A list of censored dissolved lead and zinc data is being included with this response and Appendix C of the final TMDL document has been modified to identify such data. For additional information, please see the response to comment 23.

Comment 14 – *"Adjusting observed loads for the upper watershed based on the flow at the watershed outlet is inappropriate. This approach significantly overestimates the observed loads. For example, samples collected on September 18, 2001 show a lead concentration of 9.1 ug/l in Tributary to Indian Creek. Concentrations in Indian Creek and Courtois Creek, however, were less than the detection level. MDNR applied the flow at the downstream end of the watershed to the 9.1 ug/l concentration to calculate the watershed load, suggesting a much higher lead load than likely existed on that date."*

Observed loads in the upper watershed were adjusted by normalizing the sample location flow to the watershed outlet flow, allowing the load values to be plotted on the TMDL load duration curve. Given the time of travel between Tributary to Indian Creek and downstream sampling locations on Indian Creek and Courtois Creek, differences in observed instream concentrations are expected. However, dissolved lead and zinc are conservative pollutants that do not decay or degrade as they are transported downstream. Normalization of flow is therefore a reasonable means to obtain estimates of instream pollutant loads and their probability of occurrence.

Comment 15 – *"There appears to have been an error in MDNR's calculation of the flow percentiles, resulting in the median flows presented in Tables 3-6 suggesting higher flows in Indian Creek than at the mouth of Courtois Creek, which is illogical. For example, Table 3 shows a median flow for Indian Creek at the 0-20 percent flow interval of 537.00 cfs, while Table 5 shows Courtois Creek median flow for that same interval as 344.25 cfs . Given that flows for both waterbodies were estimated using the same USGS stream gage, Courtois Creek flows should be consistently higher than Indian Creek flows. From MDNR's spreadsheet, it appears that flow percentiles for Indian Creek were calculated using several columns of the spreadsheet, rather than only a single column for Indian Creek flows."*

Tables 3-6 have been revised to show the appropriate flow values for each of the observed loads. The target load listed is the TMDL target load required at the flow value for the observed load. The flow values for Indian Creek in the tables are now below those of Courtois Creek, as would be expected.

Comment 16 – (Multiple comments regarding TMDL target loads and reduction values) "*In general, MDNR's approach appears unnecessarily complicated, setting the TMDL based on 'observed' loads, rather than simply on water quality criteria. EPA's Load Duration Curve Guidance states, ""A load duration curve is developed by multiplying stream flow with the numeric water quality target (usually a water quality criterion) and a conversion factor for the pollutant of concern." (EPA, 2007. An Approach for Using Load Duration Curves in the Development of TMDLs. EPA 841-B-07-006 http://www.epa.gov/owow/tmdl/duration_curve_guide_aug2007.pdf)"*

The load duration curves presented in the TMDL document represent the TMDLs for dissolved lead and zinc under all possible flow conditions. As detailed in Section 3.5, the chronic water quality criteria for dissolved lead and zinc were used as TMDL load duration curve targets. The TMDL document has been revised so that all TMDL target and reduction values presented in the document are consistent with this approach. The allowable loads presented in Tables 3-6 are now consistent with the load duration curve values for a given flow found in Figures 3-6. In addition, because the margin of safety for the TMDL is implicit, the previous approach to achieve target loads 90 percent of the TMDL load duration curve has been abandoned. These changes and revisions were reflected in the TMDL document placed on public notice November 3–December 13, 2009. The revised TMDL target loads are consistent with the relationship between flow and allowable load (allowable load = water quality criterion * flow * conversion factor) and percent reduction calculations from observed loads are correct.

Comment 17 – *"Page 13: It is not clear what is meant by the statement, "When establishing wasteload and load allocations, the more protective of the percent reduction required for the water body or the TMDL loading was used to set allocations." Percent reductions should be consistent with the TMDL loadings."*

This language no longer appears in the TMDL document. Wasteload allocations are now set at the 80-100 percent flow exceedence for dissolved lead and dissolved zinc in the Indian Creek and Courtois Creek watersheds. Setting the waste load allocation value at this flow exceedence is expected to be protective of water quality over all flow conditions, including critical low flow. The difference between the load capacity and wasteload allocation at each flow interval will be allocated as the load allocation since the margin of safety is implicit.

Comment 18 – *"Page 13, 2nd paragraph of section 5.1: This paragraph seems out of place and is not relevant to the WLA discussion."*

The Department concurs this information is better suited for another location in the document. The text can now be found in the point source implementation section, Section 9.1.

Comment 19 – *"Pages 14-15: Load allocations are very high at the higher flows, in some cases representing 95% of the total allowable load. Other sections of this TMDL have repeatedly referred to nonpoint sources as 'minor' and 'negligible'. If nonpoint sources are so insignificant, there is no reason to give them such a huge load allocation at the higher flows. The point sources are impacted by precipitation as recognized in the permits. Therefore, increasing WLAs should be allotted to the point sources at higher flows. This is also consistent with providing an opportunity to develop flow-tiered limits for the point sources."*

The wasteload allocations found in this TMDL are expected to be protective of all flow conditions, including critical low flow. The remainder of the load capacity available after the wasteload allocation has been allocated is set as the load allocation, as described in Section 5.3. For approximately 35 percent of the time, the wasteload allocation load is greater than or near the load allocation loading. Only at much higher stream flows (lower percent load exceedence) does the load allocation component become significantly greater. At these higher stream flows, it is expected that nonpoint sources of lead and zinc loading, especially re-suspension of lead and zinc previously deposited in the stream system, will become more significant.

Comment 20 – *"The use of the 25th percentile hardness value provides an implicit MOS, and no additional MOS should be withheld from the allocations."*

The use of the 25th percentile hardness value in calculating dissolved metals water quality criteria is required by state rule at 10 CSR 20-7.031(1)(Y). However, meeting the required water quality criteria does not in and of itself provide a margin of safety. Therefore, other rationale must be used for an implicit margin of safety, or an explicit margin of safety must be stated. Due to conservative assumptions used in developing and setting the TMDL load capacities, the margin of safety for these TMDLs is implicit. For additional information on the margin of safety, please see Section 6 of the document. Also, as stated in the response to Comment 16, the previous approach to achieve target loads 90 percent of the TMDL load duration curve has been abandoned.

Comment 21 – *"The TMDL document does not characterize all potential contaminant loading to the Courtois and Indian Creek watersheds.... the potential impacts from the historic mining and mineral processing operations in the Courtois Creek watershed should be investigated further and addressed as part of the implementation process for this TMDL."*

The Department agrees that additional information is needed to describe the historic mining and mineral processing operations in the Courtois Creek watershed. Section 2.1 of the document now includes an inventory and assessment of potential impacts from historic mining operations within the impaired watersheds. This information was collected from Missouri's inventory of mines, occurrences, and prospects, a resource maintained by the Department. Additional language regarding these historic operations and their potential impacts can be found in Section 2.1.

Comment 22 – *"The statement: "Nonpoint source reductions are currently not necessary to reduce pollutant loading of dissolved lead and zinc to the Indian Creek and Courtois Creek watersheds" is inconsistent with MDNR's allocation of a large portion of the allowable load (in some cases up to 95% of the allowable load) to these sources. A more equitable allocation should be derived, allowing higher wasteload allocations at the higher flows."*

As shown in Figures 4-7, available water quality data indicate that pollutant loading above the TMDL load duration curves occurs predominantly during low to medium flow conditions (40-100% probability of load exceedence). These flow ranges are typically driven by point source flows (80-100%) and a combination of point source and nonpoint source flow (40-80%). Therefore, at the current time, nonpoint source load reductions at the upper flow conditions (0-40%) are not necessary. However, reductions in pollutant loading from point sources will be beneficial in achieving compliance with water quality criteria at the low to medium flow conditions.

Regarding higher wasteload allocations at higher stream flows (i.e., flow-tiered limits), the Department does not believe such an allocation would be adequately protective of water quality. Numeric criteria for acute and chronic protection of aquatic life are developed based on assumptions of a frequency, magnitude, and duration of exposure to toxics. Fixed effluent limits for the mass and concentration of a toxic discharge, based on monthly average and daily maximum, are set based on statistics considering treatment variability and the exposure assumptions mentioned above. A flow-variable or flow-tiered permit limit can undermine the exposure assumptions used in the water quality standards to permit limit process (i.e. the statistics and methods found in EPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001)). Because flow-tiered permit limits would not be based on the assumption that the numeric criteria should not be reached or exceeded more than once every three years on average, any violation of the permit limit becomes a de facto violation of numeric water quality standards, without regard to frequency of occurrence. The flow-variable or flow-tiered approach would therefore not be protective of water quality.

In addition to the water quality concerns stated above, flow-variable or flow-tiered effluent limits are difficult to implement and to assess compliance with. Without fixed effluent limits for mass and concentration, it can be difficult to assure that treatment is occurring at the facility. When stream flows are high, the flow-variable loading (expressed as lbs/cfs/day) may appear low, while actual mass loadings (expressed as lbs/day) may be increased due to relaxed effluent limits. Flow-variable effluent limits also clearly allow an increased discharge of pollutants to waters of the state. The ability to discharge more pollutants when stream flows are elevated provides an incentive to store and meter discharge of effluents, rather than provide treatment. Where storage is not available, Flow-variable effluent limits allow and encourage diminished treatment of wastewater which could lead to backsliding and antidegradation concerns. For these reasons, and the water quality concerns stated above, the Department cannot support flow-tiered effluent limits during implementation of the Indian Creek and Courtois Creek TMDL.

Comment 23 – *"The range of the lead data shown in Appendix B is very broad, ranging from <0.08 ug/l to <100 ug/l. The <100 ug/l seems particularly high and might be due to a data entry error. This could result in a significant overestimation of loads, and should be examined."*

As noted in Section 3.5.2, the United States Geological Survey (USGS) collected the majority of the water quality data in the Courtois Creek watershed and used two different laboratories that employed different analytical methods and various detection levels. The <100 µg/L value is not a data entry error, but rather an inexact estimate. The USGS reported data in this manner for a couple of years prior to requests by the Department for more specific values. Following the Department's request, the USGS re-coded much of the data to be less than a smaller value based on analytical and quality assurance/quality control data on file. However, values lacking appropriate documentation to allow re-coding remained <100 µg/L. As stated in Comment 13, data values coded as <100 µg/L are considered censored data and were not used in the TMDL analysis (e.g. estimation of pollutant loads).

Comments Received During the Second Public Notice Period (Letter dated December 11, 2009)

Comment 1 – *"Doe Run routinely collects water quality data at three locations required in the NPDES permit, Outfalls 002 (old tailings pond discharge to Indian Creek), 004 (new tailings pond discharge to Tributary to Indian Creek), and 007 (instream monitoring location in Courtois Creek just downstream of the confluence with Indian Creek). In addition, Doe Run has collected samples in Courtois Creek upstream of Indian Creek, and in Indian Creek upstream of Outfall 002 and Tributary to Indian Creek. EPA-approved methods are used for sampling and analysis, and Doe Run's laboratory is State Certified. Therefore, these data are appropriate for use in the TMDL."*

The Department appreciated the opportunity to review hardness data provided by the Doe Run Company on November 11, 2009 for Indian Creek and Courtois Creek. The information contained in the above comment on EPA-approved sampling and analysis methods and certification of the laboratory used is also appreciated. However, as stated in the November 10, 2009 e-mail to LimnoTech and Doe Run concerning this matter, QA/QC at the level required by the state's 303(d) LMD is the minimum level the Department would consider for determining TMDL targets and modeling. The 303(d) LMD outlines the QA/QC program specifics necessary for third party data to be accepted (See Section II.C., "Data Quality Considerations"). In the absence of such documentation, the TMDL calculations relied on the hardness data already collected by the Department and USGS.

Regarding hardness data contained in the TMDL document, the document placed on public notice mistakenly contained an abbreviated Appendix C which did not list all of the data used in the analysis. As an example, the abbreviated Appendix C contained 21 samples of instream hardness data for Courtois Creek, as referenced in Doe Run's comment. The complete Appendix C actually contains 44 samples of instream hardness data for Courtois Creek. Appendix C has therefore been updated to include all of the available hardness and other data for Indian Creek, Tributary to Indian Creek, and Courtois Creek mistakenly omitted from the previous version of the document. The addition of the omitted data to Appendix C does not change the calculated 25th percentile hardness value for the Courtois Creek watershed (170 mg/L) as these values were included in the original hardness calculation.

Comment 2 – *"The draft TMDL does not consider the existing discharge flow rates from the Doe Run facility in assigning the WLAs, nor does it consider the dependence of the discharge flow rates on precipitation and the increase in assimilative capacity of the streams with increasing stream flows. Instead, the draft TMDL assigns a single WLA for all stream flow intervals based on an arbitrary low flow value. In doing so, the draft TMDL includes arbitrarily stringent WLAs. Instead, the TMDL should include a WLA that, at a minimum, allows Doe Run to discharge an effluent that meets the applicable water quality standards at the end-of-pipe at critical low-flows, and considers the increased assimilative capacity of the streams at higher stream flows."*

The TMDL load duration curves for Indian Creek and Courtois Creek are expected to be protective of water quality under all flow conditions, including critical low flow. Critical low flow conditions are used to set effluent limitations for permitted facilities to ensure water quality in the receiving stream is not impacted at an unacceptable frequency of occurrence. The flow value selected to be representative of critical low flow conditions in Indian Creek (3.66 cfs) is much greater than the design flow listed on the Doe Run, Viburnum operating permit effective December 4, 2009 (0.95 cfs). The critical low flow value and corresponding pollutant loads are therefore protective of water quality during critical low flow conditions and include some flows above the facility design flow.

Regarding flow-tiered wasteload allocations and effluent limits, please see the response to Comment 22. As noted in that response, flow-tiered effluent limits encourage diminished treatment of pollutants and may result in an increase of pollutant loading to the impaired water body. For these reasons, the Department cannot support flow-tiered wasteload allocations during implementation of the Indian Creek and Courtois Creek TMDL. Wasteload allocations are based on the critical low-flow design condition and will be protective of water quality under all flow conditions.

Also referenced in this comment are loading analyses provided to the Department by the Doe Run Company and LimnoTech on October 22, 2009. These loading analyses investigated the concept of greater pollutant loads at higher flow intervals. The Department appreciates the opportunity to review and consider these analyses. However, as noted in the response to Comment 22, the Department cannot implement flow-tiered wasteload allocations for the Indian Creek and Courtois Creek TMDLs. While nonpoint sources of dissolved lead and zinc are minor or negligible under critical low-flow conditions, historic and legacy lead and zinc within the stream system can be sources of these metals, especially during higher flows. As conservative pollutants, these metals do not degrade and historic lead and zinc can become re-suspended into the water column and carried downstream via natural fluvial processes. Significant metals suspension and re-deposition can occur during and immediately following high-flow storm events. This process allows previously unavailable lead and zinc to enter the water column and become a water quality concern. It is therefore reasonable to have load allocations for lead and zinc at higher flows to account for nonpoint source instream loading of these pollutants.

Comment 3 – *"The "Problem Definition" section of a TMDL usually includes a comparison of observed concentrations to water quality criteria, confirming the impairment and demonstrating the magnitude and frequency of violations. This section contains no such discussion of the impairments. Such a comparison is particularly important in this case, due to the significant reductions in Doe Run's discharges of lead and zinc, and the lack of recent biological assessment data."*

The comment above is similar to the one found in the Doe Run Company's October 22, 2009 comment letter to the Department regarding the first public notice for this TMDL. The Department's response to this comment can be found under "Comment 1" earlier in this response letter.

The scope and depth of TMDL "Problem Definition" sections can vary widely by state, tribe, and EPA region. The Department believes the information and data outlined in the comment above are competently addressed in "Defining the Problem" (Section 1.4) and Appendix C of the document. Confirmation of the impairment and the data used can be found in the administrative record for the 2004/2006 303(d) listing cycle.

Comment 4 – *"This section indicates that only uncensored data were used to plot observed pollutant loads. A summary of the data, including how many data points were censored, should be provided. Excluding censored data ignores valuable information and, in combination with MDNR's adjustment of pollutant loads based on stream flows at the watershed outlet, can make it appear that there are more frequent exceedances of the allowable load than the data truly indicate."*

The comment above is similar to comments found in the Doe Run Company's October 22, 2009 comment letter to the Department regarding the first public notice for this TMDL. The Department's response to these comments can be found under Comment 13, Comment 14, and Comment 23 earlier in this response letter. As noted in the response to Comment 13, a list of censored dissolved lead and zinc data is being included with this response.

Comment 5 – *"It is unclear how MDNR derived the flow values presented in Tables 3-6. They do not appear to consistently match up with flows for the corresponding probabilities as presented in MDNR's spreadsheet or in Tables 7 -10. For example, it appears from MDNR's spreadsheet that the flow for the 80-100 percent exceedence interval for Courtois Creek, as presented in Table 5, corresponds to the 96th percentile exceedence flow, while the flow for the 60-80 percent interval corresponds to the 72nd percentile exceedence flow. Further, in a typical load duration curve application, one would expect to see consistent flows across the exceedence intervals for the same waterbody. That is, the 80-100 percent exceedence flow for Indian Creek, for example, should be the same, regardless of the pollutant. Thus, Flows listed in Table 3 should be the same as those in Table 4, and Table 5 flows should be the same as Table 6 flows."*

Tables 3-6 detail the largest percent reductions of existing pollutant loads necessary to meet the TMDL loading targets within the Indian Creek and the Courtois Creek watersheds. Therefore, the flow values presented in Tables 3-6 correspond to the observed load values requiring the largest percent reduction. Clarifying language has been added to Section 4.3 of the document. Tables 7-10, which present the TMDL load capacity, wasteload allocation, and load allocation values, display consistent flow values for each exceedence interval across the tables.

Comment 6 (listed as Comment 5, page 5) – *"There appears to have been an error in MDNR's calculation of the flow percentiles, causing the flows presented in Tables 7-10 to indicate higher flows in Indian Creek than at the mouth of Courtois Creek, which is illogical given the much smaller Indian Creek watershed. For example, Table 7 shows a flow for Indian Creek at the 0-20 percent flow interval of 265.0 cfs, while Table 9 shows a Courtois Creek flow for that same interval as 201.9 cfs. Given that flows for both waterbodies were estimated using the same USGS stream gage,*

Courtois Creek flows should be consistently higher than Indian Creek flows. From MDNR's spreadsheet, it appears that flow percentiles for Indian Creek were calculated using several columns of the spreadsheet, rather than only a single column for Indian Creek flows."

The Department appreciates the Doe Run Company and LimnoTech's thorough review of the TMDL document and supporting materials. Upon further review, the Department has determined that the flow interval values for the Indian Creek dissolved lead and zinc TMDLs are incorrect. As referenced in the above comment, additional columns of data were included in the percentile flow analyses and resulted in inaccurate calculations of flow values for Indian Creek. These inaccurate flow values subsequently resulted in inaccurate calculations of dissolved lead and zinc load capacities for Indian Creek.

The Department appreciates being made aware of these errors and has corrected the Indian Creek spreadsheet. Revising the spreadsheet flow interval calculations resulted in new flow and dissolved lead and zinc TMDL load capacity values for Indian Creek. Because these load capacity values are different than those previously placed on public notice, the Indian Creek TMDL figures and tables have been updated and the TMDL document will be placed on 30-day public notice for additional comments.

Comment 7 – *"Doe Run requests a list of all censored data and an explanation as to why MDNR did not use the data in its calculations."*

The Department is enclosing a list of all censored dissolved lead and zinc data for the Indian Creek and Courtois Creek watersheds. Additionally, Appendix C of the final TMDL document has been modified to identify data that is censored. For an explanation as to why censored data was not used, please see the responses to Comments 13 and 23 for the letter dated Oct. 22, 2009.

Thank you again for your comments. If you should have questions or would like to discuss this TMDL further, please contact me at (573) 526-1446 or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102.

Sincerely,

WATER PROTECTION PROGRAM

John Hoke, TMDL Unit Chief
Water Quality Monitoring and Assessment Section

JH:mkl

Enclosures

Censored Zn data for the Indian Creek/Courtois Creek TMDL

Site	Site Name	WBID	Altsite1	Org	Yr	Mo	Dy	Flow	Hard	TZN	DZN
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1994	6	23	82	210	6	1.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1995	1	12	85	210	5	1.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1996	1	17	62	160	1.99	1.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1998	1	12	230	170	4.99	9.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1998	6	15	220	170	4.99	9.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1999	1	7	82	250	4.99	9.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1999	6	14	90	200	19.99	9.99
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2001	6	28	2			2.499
1943/23.4	Courtois Creek 4 mi. N. of Courtois, MO.	1943		MDNR	2001	9	18	6.8	260		2.499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2001	9	18	1.2	190		2.499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2001	10	4	2			2.499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2002	4	3	18.3	130		2.499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2002	11	6	6			4.99
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2003	3	13	10			4.99
1946/0.1	Indian Cr.@ old Hwy C, 2 mi.bl. Viburnum tailin(	1946		MDNR	2003	7	10	4			0.499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2004	5	17	13.2			0.12499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2005	6	25	2.5			0.499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2005	6	29	5			0.499

Censored Pb data for the Indian Creek/Courtois Creek TMDL

Site	Site Name	WBID	Altsite1	Org	Yr	Mo	Dy	Flow	Hard	TPB	DPB
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1994	1	19	77	210	1	0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1994	6	23	82	210	1	0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1995	1	12	85	210	2	0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1996	1	17	62	160	0.499	0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1996	6	24	47	170	0.499	0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1997	1	29	413	110	1	0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1997	6	19	313	140	0.499	0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1998	1	12	230	170	0.499	49.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1998	6	15	220	170	0.499	49.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1999	1	7	82	250	0.499	49.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1999	6	14	90	200	0.499	49.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	1999	11	15	30	230	0.499	49.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	2000	5	17	27	220	0.499	49.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	2001	5	10	43	200	0.499	0.0399
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2001	5	31	5.6			1.2499
1946/0.1	Indian Cr.@ old Hwy C, 2 mi.bl. Viburnum tailin(	1946		MDNR	2001	5	31	16.7			1.2499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2001	6	28	2			0.99
1946/0.1	Indian Cr.@ old Hwy C, 2 mi.bl. Viburnum tailin(	1946		MDNR	2001	9	18	0.5	310		1.2499
1943/23.4	Courtois Creek 4 mi. N. of Courtois, MO.	1943		MDNR	2001	9	18	6.8	260		1.2499
1943/29.0	Courtois Cr. bl. Indian Cr., 2.2 mi.bl. Tailings	1943		MDNR	2001	9	18		260		1.2499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2001	9	18	1.2	190		1.2499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2001	10	4	2			1.2499
1946/0.1	Indian Cr.@ old Hwy C, 2 mi.bl. Viburnum tailin(	1946		MDNR	2001	10	4	3			1.2499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	2001	11	1	29	240	0.499	0.0399
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2002	4	3	44.2	170		0.99
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2002	4	3	18.3	130		0.99
1943/23.4	Courtois Creek 4 mi. N. of Courtois, MO.	1943		MDNR	2002	4	3	84.9	170		0.99
1946/0.1	Indian Cr.@ old Hwy C, 2 mi.bl. Viburnum tailin(	1946		MDNR	2002	7	2	9.94			1.2499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2002	7	2	4.67			1.2499
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2002	11	6	6			0.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	2002	11	12	57	220	0.499	0.0399
1946/0.1	Indian Cr.@ old Hwy C, 2 mi.bl. Viburnum tailin(	1946		MDNR	2003	3	13	15.7			0.99
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2003	3	13	10			0.99

1943/5.1	Courtois Cr. ab. Bass Creek Resort	1943		MDNR	2003	4	3	156	183		0.99
1943/0.9	Courtois Cr. nr mouth	1943		MDNR	2003	4	3	164	187		0.99
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	2003	11	10	37	240	0.16499	0.0399
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2004	5	17	13.2			0.12499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	2004	11	9	68	220	0.05	0.0399
1943/29.5	Courtois Cr. ab. Indian Cr. @old Hwy C	1943		MDNR	2005	6	29	5			0.499
1943/15.7	Courtois Cr. @Hwy 8	1943	USGS 07014200	USGS	2006	11	8	75	230	0.04	0.0599
1947/2.0/1.0	Courtois Cr. @ Goodwater,ab.Viburnum tailing	1947		MDNR	2008	9	30	3.55	143		0.12499